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24 August 1979

# USSR Report

INDUSTRIAL AFFAIRS

No. 504



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## USSR REPORT

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## AUTOMOTIVE AND TRACTOR INDUSTRY

### CONSUMERS SURVEYED ABOUT AUTOMOTIVE SERVICING

Moscow ZA RULEM in Russian No 5, May 79 pp 12-13

[Article: "The Automobile and Spare Parts"]

[Text] The questionnaire published in the October issue of our magazine for 1976 was devoted to this complex and contradictory, vitally important problem. The branch of the Central Scientific Research Institute of Automobiles and Automobile Engines (NAMI) prepared it in order to, relying on statistical data, present the conditions which determine the demand for spare parts among our automobile owners. The questionnaire incidentally made it possible to determine some data with respect to the composition of the privately owned automobile fleet and the nature of their operation. Research associates of the institute, Candidates of Technical Sciences Ye. P. Blyudov and V. K. Tolkachev and Engineers B. G. Skundin and V. B. Uralis acquaint us with the conclusions obtained upon analysis of the questions.

But before giving them the floor, we would like to return to 11 years ago. The results of a questionnaire, similar in a number of aspects to the current questionnaire, were published in the May issue of ZA RULEM for 1968. At that time there were about four times fewer privately owned vehicles and servicing had only begun to be organized as a system. We feel that it would be interesting to present some data of that questionnaire for comparison.

The composition of the privately owned automobile fleet by makes was: 53 percent Moskvich, 26 percent Pobeda and Volga and 20 percent Zaporozhets.

The distribution of the vehicles by populated points was: large cities (Moscow, Leningrad and the capitals of the union republics) -- 30 percent, oblast and rayon centers -- 55 percent and urban type villages and rural settlements -- 15 percent.

The fraction of annual mileage on asphalt-paved, concrete and gravel roads and also by grader was 27 percent with an average mileage of 8,825 kilometers.

And now, the results of the last investigation.

The questionnaire about which we are talking was an important link in an entire chain of investigations, the idea of which was to study the operating conditions of private automobiles, the demand for spare parts and their consumption in the interests of further development of service and supply of STO [Technical servicing station] and department stores with spare parts. In analyzing the obtained data, one must bear in mind that they reflect the situation for the period from October 1976 through March 1977.

A total of 8,115 subscribers responded to the questionnaire, which comprises a small percentage of readers of the magazine. Nevertheless, their answers permit one to make conclusions with an adequate degree of confidence and to apply them to the entire mass of automobile owners. The basis is comparison with the results of another investigation which we conducted (the responses of automobile owners to forms with the assistance of GAI [State automobile inspection] and VDOAM [Expansion unknown]) and the use of the so-called non-random method of sampling units of observation. We processed the responses on computers by a specially prepared calculating program. We also analyzed numerous letters sent by readers with the questionnaire, which in themselves serve as an indication of the interest in the problem touched upon.

Let us turn to some figures. Of the total number of those responding to the questionnaire, 22.8 percent are automobile owners from large cities (with number of residents above 750,000 persons), 39.5 percent are from medium cities (from 50,000 to 750,000 persons) and 37.7 percent are from small towns and villages (less than 50,000 persons). Their average driving experience is 8.2 years. Volga owners have the longest driving experience -- 10.5 years, followed by Moskvich owners -- 8.6 years, Zhiguli owners -- 7.9 years and Zaporozhets owners -- 7.5 years.



Figure 1. Fraction of Individual Models of Automobiles Among the Total Number Investigated (Percent): 1 -- BAZ-21011 (4.6); 2 -- BAZ-2103 (10.1); 3 -- BAZ-2102 (3.6); 4 -- BAZ-2101 (37.9); 5 -- Moskvich-407 (2.6); 6 -- Moskvich-408 (8.1); 7 -- Moskvich-412 (14.8); 8 -- ZAZ-968 (5.8); 9 -- ZAZ-966 (3.3); 10 -- ZAZ-965 (2); 11 -- GAZ-21 (4.9); 12 -- GAZ-24 (1.3); 13 -- Miscellaneous (1)

Data on the structure of the fleet by models and makes are very important. They are represented by diagram 1. The main characteristics in the use of these vehicles (average age, average total mileage, average annual mileage and length of operation) are contained in diagram No. 2.

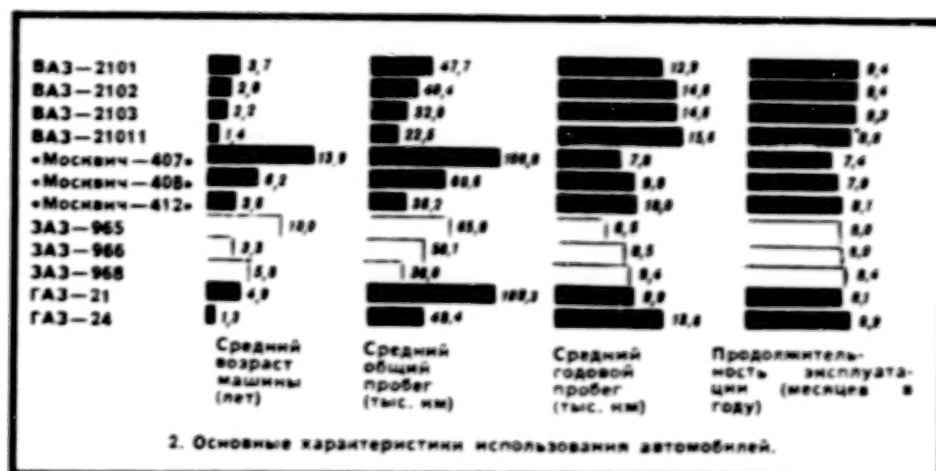


Figure 2. Main Characteristics of Automobile Use

Key:

- |                                   |                                                 |
|-----------------------------------|-------------------------------------------------|
| 1. BAZ                            | 6. Average total mileage (thousand kilometers)  |
| 2. Moskvich                       | 7. Average annual mileage (thousand kilometers) |
| 3. ZAZ                            | 8. Length of operation (months per year)        |
| 4. GAZ                            |                                                 |
| 5. Average age of vehicle (years) |                                                 |

The vehicle is operated for an average of 8.8 months per year. This high length of use is explained to a significant degree by the greater number of Zhiguli automobiles, which have given a good account of themselves under cold climate conditions. The questionnaire determined that Zhiguli automobiles are operated 1.6 months longer per year (by 16 percent) than machines of other makes.

Of all the indicators which characterize the operating conditions, the most important is the annual mileage, since it reflects the intensity of use of the automobile. It comprised an average of 11,000 kilometers.

Road conditions during operation were evaluated by the fraction of mileage on good roads, that is, on asphalt, concrete, smooth gravel and graded roads. The answers showed that it hardly depends on the make of the vehicle. There is an average of 69 percent of the mileage on good roads. The mileage on good roads varies as a function of the owner's place of residence: 78 percent in large cities, 72 percent in medium cities and 61 percent in small towns and in the countryside.

Traffic intensity, manifested in the fraction of mileage combined with partial changing of gears, braking and accelerations, also affects the demand for spare parts. Under these conditions, Zhiguli owners comprise 68 percent of the mileage, Moskvich owners comprise 78 percent, Zaporozhets owners comprise 55 percent and Volga owners comprise 58 percent. This is explained by the fact that Zhiguli and Moskvich automobiles are most frequently operated in large and medium cities and suburban zones.

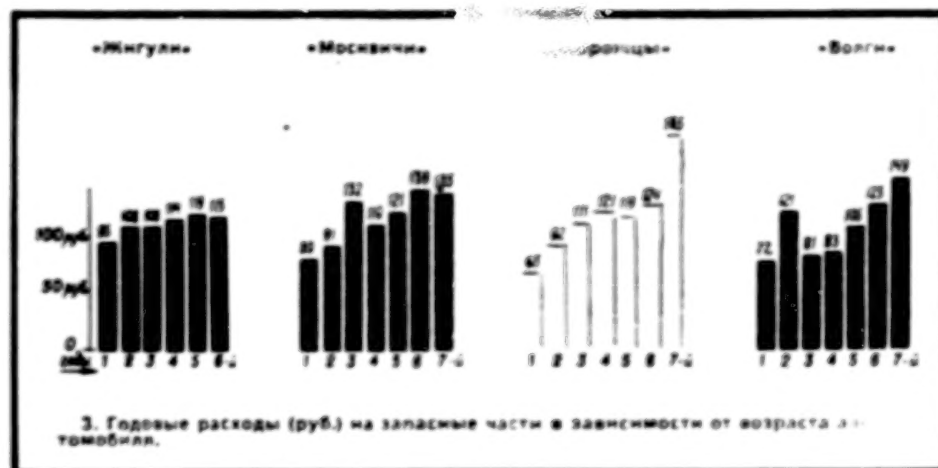


Figure 3. Annual Expenses (Rubles) for Spare Parts as a Function of the Age of the Automobile

Key:

- |                |           |
|----------------|-----------|
| 1. Zhiguli     | 4. Volga  |
| 2. Moskvich    | 5. Rubles |
| 3. Zaporozhets | 6. Years  |

The number of mechanical damages to the automobile both during travel and during servicing, repair and storage (crumpled fenders during winter parking, broken windows and so on) also has a significant effect on the consumption of spare parts. The fraction of vehicles generally not having damage during the course of operation comprises 70.9 percent for Zhiguli automobiles, 66.7 percent for Moskvich automobiles, 66.6 percent for Zaporozhets automobiles and 57.3 percent for Volga automobiles. And the average number of damages per vehicle per year comprises 0.14 for Zhiguli, 0.1 for Moskvich, 0.11 for Zaporozhets and 0.08 for Volga automobiles. The Zhiguli automobiles seem somewhat worse here, which may be explained by their higher average annual mileage.

Knowing all the factors and correctly taking them into account, we can now turn to analysis of the questionnaire which characterizes the annual consumption of spare parts. As can be seen from Figure 3, expenditures for spare parts in rubles (data related to 1976) increase with the age of the vehicle and they are very significant: almost double during 7 years. What are the

owner's expenditures for spare parts acquired at STO and in department stores? They comprised 47.9 and 60.2 rubles, respectively, for VAZ automobiles, 44.9 and 74.8 rubles for Moskvich automobiles, 44.4 and 72.2 rubles for Zaporozhets automobiles and 41.8 and 120.2 rubles for Volga automobiles.

Thus, according to data of questionnaire respondents, an average of 1.5 times more spare parts are obtained through department stores than at the STO. Two factors may be indicated here. On the one hand, the fact that development of the automobile servicing network is still lagging behind the growth of the privately owned automobile fleet and on the other hand, many still prefer to repair and service their automobiles themselves and a good many of them store parts for the future (we will talk about this specially).

And how are the need for spare parts and the annual mileage of automobiles related? The consumption of spare parts as a function of mileage (Figure 4) is of great interest directly for automobile owners, whereas the previous data are mainly for workers of the automobile industry and trade.

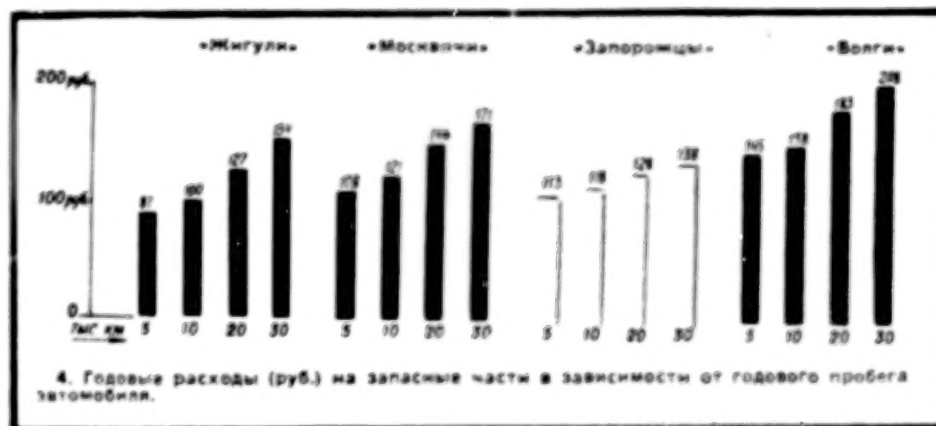


Figure 4. Annual Expenses (Rubles) for Spare Parts as a Function of the Annual Mileage of the Automobile

Key:

- |                |                        |
|----------------|------------------------|
| 1. Zhiguli     | 4. Volga               |
| 2. Moskvich    | 5. Rubles              |
| 3. Zaporozhets | 6. Thousand kilometers |

How do Figures 3 and 4 agree and are there not contradictions in them? No, there are not. The fact is that the latter figure contains data for the "average" ages of vehicles. Thus, specifically, 80 percent of the expenditures among Volga vehicles for model GAZ-21, production of which was stopped in 1970, and this is natural since their age is 7 years or more.

The questionnaire also illuminated the problem of the total average sum that the vehicle stores necessary spare parts. This problem is extremely important



when determining the demand for spare parts. The fact is that a large part of vehicle owners always buys parts for the future in case of breakdown. One of the reasons for this is the shortage of spare parts. The opposite relationship also occurs: as soon as a shortage for a specific part is noted, automobile owners immediately try to acquire this spare part, which in turn only intensifies the shortage. Calculations show that the spare parts worth 100 rubles for Zhiguli automobiles reduces the average idle time of the vehicle by only 2.3 days per year. The same 100 rubles provides a reduction of idle time by 5.8 days for Zaporozhets automobiles. The storage of spare parts worth a large sum is not feasible since it only slightly reduces the total idle time due to the absence of the necessary part at the proper moment.

However, most automobile owners continue to maintain a regular number of spare parts. Only 14.3 percent of those questioned do not have them. The remaining respondents comprise 63.1 percent with parts worth 100 rubles, 15.0 percent with parts worth 100-200 rubles, 5.1 percent with parts worth 200-300 rubles and 3.5 percent with parts worth more than 300 rubles.

The total price of these parts comprises an average of 67 rubles and it is least -- 57 rubles among Zhiguli owners, 77 rubles among Moskvich owners, 62 rubles among Zaporozhets owners and 137 rubles among Volga owners. The price of the stored part comprises 53 to 84 percent of the annual actual operating expenses, depending on the make of the automobile. In this case it increases as the vehicle ages, which can be seen in Figure 5.

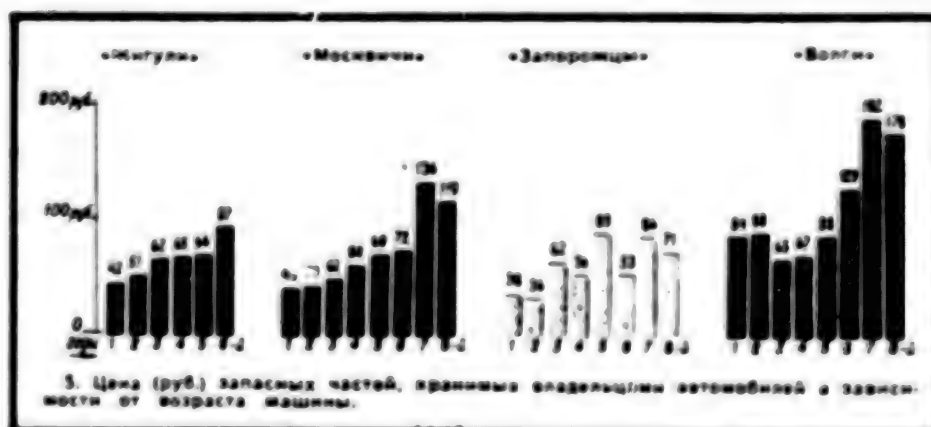


Figure 5. Cost (Rubles) of Spare Parts Stored by Automobile Owners as a Function of the Age of the Vehicle.

Key:

- |                |           |
|----------------|-----------|
| 1. Zhiguli     | 4. Volga  |
| 2. Moskvich    | 5. Rubles |
| 3. Zaporozhets | 6. Years  |

If the psychology of private automobile owners is such that many of them store more or less scarce spare parts for themselves, then are they prepared to buy any part? The questionnaire revealed that more than 10 percent of the total number wish to store subassemblies and parts costing up to 10 rubles, while only 1 percent buy spare parts costing 20 rubles (only 3 parts -- the windshield, storage battery and carburetor -- comprised an exception). The configuration is possibly somewhat different now -- even so the situation with spare parts is improving but nevertheless there is still a sufficient number of spare parts hunters.

One of the tasks of the questionnaire was to study the demand for spare parts by specific nomenclature (138 designations). These included both more rolling parts and those which enjoy medium and small demand, but required during emergency repairs.

And what about it? The average automobile owners would like to acquire spare parts of 45 nomenclatures. Among them are the gasket for the block cover (42 percent desire a spare), windshield (38 percent), axle cap (38 percent), headlights (34 percent), fuel pump diaphragm (31 percent), turn indicators (26 percent) and parking light diffuser (21 percent). These figures show that a relatively large fraction of vehicle owners tend to acquire parts of a rather wide nomenclature. It is difficult to satisfy this demand in practice. And it is no accident that in many countries the need and planning for spare parts production for private automobiles are determined only in calculation for replacement of a failed part with a spare part. Incidentally, we note that the highest demand for some subassemblies and parts reflects a situation established in the spare parts supply system. Thus, temporary interruptions in delivery of windshields for Zhiguli automobiles immediately increased the demand. Underfulfillment of a design or the technology of manufacturing spare parts has the same effect on demand. Specifically, cases of increased wear of camshafts on Zhiguli automobiles, noted in the past, were expressed in a desire of 20 percent of their owners to have this part in reserve. For comparison, let us point out that a similar desire was determined among only 6 percent of Zaporozhets owners and 5 percent of Moskvich owners.

The questionnaire provided material on the demand and consumption of spare parts. Its results have been reduced to data of the automotive plants and enterprises which manufacture complete sets of articles and spare parts. The questionnaire data will be useful to them for more justified planning of production. Moreover, the results of the questionnaire have been sent to all the republic organizations of Avtotekhnobsluzhivaniye [Expansion unknown] and will help them to compile orders more correctly with regard to the interests of automobile owners.

In conclusion, we would like to thank all those who responded to our questionnaire.

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## AUTOMOTIVE AND TRACTOR INDUSTRY

### NEW KAMAZ TRUCKS DESCRIBED

Moscow ZA RULEM in Russian No 6, 1979 signed to press 24 Apr 79 p 12

[Article by V. Barun, chief designer, KAMAZ: "New KAMAZ Trucks on the Production Line"]

[Text.] In 1979, plants of the Kama association for production of heavy cargo trucks (KAMAZ) began mass production of the new long-base ten-ton capacity KAMAZ-53212 truck-tractor. It is intended for inter-city transport on improved roads and is rated for towing the dual-axle, ten-ton capacity trailer model 8352. Thus, the new tractor-trailer as a whole is rated at 20 tons.

The truck has an increased capacity walled bed 6.1 meters long with a volume of 32 cubic meters under the canopy. The same bed is mounted on the trailer. Thus the tandem trailer truck holds up to 64 cubic meters of various containerized goods which are delivered under seal to the consignee.

Mounted on the KAMAZ-53212, depending on the specific nature of the inter-city transport, is a cab with sleeping area, a fuel tank enlarged to 250 liters, and a bed made to TIR\* [expansion unknown] standards. Some of the new vehicles will have a new gudgeon-pintle type rear towing device which provides slack-free coupling of the tractor with the trailer. Such a device restricts the influence of the trailer, eliminates jerks and dynamic loading on the coupling and makes it possible to increase speed and traffic safety. Individual trucks will be delivered with special safety bars on the back part of the chassis. Later on, the slack-free coupling and bar will be installed on most KAMAZ trucks with sides.

To a considerable extent, the new machine has been standardized with the previous model side-body truck, the KAMAZ-5320. Of course, it has a number of design differences related to the increase in cargo-carrying capacity (from 8 to 10 tons) and the wheel base (from 3,850mm to 4,350mm).

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\*TIR is a system of international motor transport (see Za Rulem, 1978, No. 9, p. 23)

The chassis beams of the KamAZ-53212 are of a new, high-strength steel; the front wall has been made higher; and the distance from the floor to the canopy has been increased to 2.2 meters. In addition, the rear springs and where they attach, have been strengthened; the beams of the middle and rear drive axles are more rugged; the effectiveness of the brakes has been increased; and 140mm-wide brake shoes have been installed (the KamAZ-5320 had 120mm). The metal sides of the bed consist not of two, but three side-ways-folding sections.

Mounted on the KamAZ-53212 cab, as with other Kama truck modifications, are aerodynamic mud deflector panels which protect the side glasses and cab doors. The panels direct the air flow along the doors and cut off sprays of dirty water.

New long-base truck chassis (they have received the number KamAZ-53213) will be supplied without beds to specialized plants for outfitting with tanks, lifting mechanisms, concrete pumps, and other equipment of various functions required for municipal and road work. Thus, along with a fleet of KamAZ cargo trucks, high capacity, specialized, and user-oriented machinery will appear on the chassis of this brand.

Owing to the greater load carrying capacity, the KamAZ-53212 is 15-20% more efficient than the 5320 model, but it consumes practically as much fuel and oil.

The new long-base KamAZ-53212 and its chassis, the KamAZ-53213 will supplement the well-known 5320, 5410 and 5511 vehicles, production of which will continue at Naberezhnye Chelny in ever greater numbers. Preparations for the production of other models also will continue. We expect to inform the readers of Za Rulem of this during the next encounter.

#### Brief Technical Characteristics of the KamAZ-53212 Truck-Tractor

General data. Equipped weight--8,200 kg. Cargo carrying capacity--10,000 kg. Cargo carrying capacity of towed trailer--10,000 kg. Wheel arrangement--6x4. Maximum speed--80 kmh. Standard fuel consumption--27 liters per 100 km (individual truck) and 35 liters per 100 km (trailer truck). Fuel supply--250 liters.

Dimensions. Length--8,930 mm. Width--2,500 mm. Height--3,650 mm. Loading height--1,370 mm. Wheel base--4,350 mm to borey center of balance and 1,320 mm for rear bogey. Track--2,026 mm for front wheels; 1,850 for rear. Road clearance--285 mm.

Engine. Number of cylinders--8. Operating volume--10,850 cc. Power--210 hp at 2,600 rpm.

Transmission. Clutch--dry double disc. Gearbox--ten-speed with forward divider. Main transmission--compound with spur and bevel gears and gear ratio 7.22, 6.53, 5.94, or 5.43. Inter-axial differential--interlocked.

Steering. Steering wheel--hydraulic assist. Brakes--drum-type on all wheels with separate, two-circuit, pneumatic control. Parking brake--pneumatic control and spring-actuated power accumulator.

Running gear. Front wheel suspension--dependent, on longitudinal springs and telescoping shock absorbers. Rear suspension--balanced, dependent, and on longitudinal springs. Tire size--260-508 ; standard number of plies--12.

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## AUTOMOTIVE AND TRACTOR INDUSTRY

### BRIEFS

JAPANESE FORGE ASSEMBLY LINE--Moscow's V/O "Avtopromimport" has purchased a forge assembly line from the Japanese firm "Toyo Menka Kaisha Co. Ltd.". The line, which will produce vehicle connecting rods, is to be delivered to the "Avtodiesel" trust in Yaroslavl' in the first quarter of 1980. Built around a forge press with a 4500 "megapond" [Note: 1 megapond = 1000 kiloponds/ 1 kilopond - 9.80665 meter kilograms per second squared (the weight of 1 kilogram of mass at sea level on the 45th parallel). Therefore, 1 megapond equals approx. 9807 newtons.] [Bonn DIE WIRTSCHAFT DES OSTENS in German 29 Jun 79 p 8]

CSO: 1821

## CHEMICAL INDUSTRY AND RELATED EQUIPMENT

### REPORT ON TOL'YATTI-ODESSA AMMONIA PIPELINE

Moscow EKONOMICHESKAYA GAZETA in Russian No 29, 1979, p 24

[Article by I. Guriev]

[Text] The Togliatti-Odessa ammonia pipeline, a complex engineering facility extending for over 2,400 km, will be put in operation this year. The first phase of the project covers a 800-km long section leading from Gorlovka which houses the Styrol production association to Grigorievsky Lagoon, near Odessa, with its new chemical port. The port will receive ammonia by pipeline from Togliatti where a large nitrogen fertilizer plant is being built. The transportation of large amounts of liquid ammonia by underground pipeline has a number of economic advantages over railway.

The ammonia pipeline now under construction will be the biggest project of its kind in Europe. It crosses the territories of 13 regions of the Russian Federation and the Ukraine. It crosses 37 railroad lines, 89 highways and 107 rivers and reservoirs. The pipes are made of a special steel.

Several institutes worked out the technical design. The general design was done by GIAP (State Scientific Research and Planning Institute of the Nitrogen Industry and Products of Organic Synthesis) and its branches. "Giprotruboprovod" (State Institute for the Planning of Main Pipelines) designed the line portions and "Giprosvyaz'-3" (State Institute for the Surveying and Planning of Communications Installations) designed the communications and remote-control equipment. In addition, another 23 design organizations took part in the designing of electrical power supplies, highway and underwater crossings, access roads to pumping and distributing stations, living quarters and other units.

The pipeline will be equipped with an automatic control system incorporating the latest remote control and computing facilities. Fourteen stations, built along the pipeline, will pump liquid ammonia under high pressure from Togliatti to Odessa.

The pipeline will handle 2.5 million tons of liquid ammonia a year. The commissioning of the project's first phase, the Gorlovka-Odessa section, will make it possible to pump over 800,000 tons of ammonia. This will take pressure off railway and release over 1,200 railway tank cars for use elsewhere. The completion of the pipeline will release about 4,500 railway tank cars and reduce railway traffic by almost 2.5 million tons. This points to the effectiveness of pipeline transport, the further development of which is envisaged in the decisions of the 25th CPSU Congress.

The new pipeline has another important advantage. Its commissioning will make it possible to increase the provision of agriculture in some regions of the Russian Federation and the Ukraine with water-free ammonia which is the most effective type of mineral fertilizers. Liquid ammonia contains over 82 percent of nitrogen, the nutrient, whereas solid fertilizers, ammonium nitrate and carbamide, contain as little as 34 and 46 percent of nitrogen, respectively.

Twenty nine distribution outlets are being built along the Togliatti Odessa route. Three of them are in the Kuibyshev region, seven in the Saratov region, five in the Voronezh region, one in the Tambog region, two in the Belgorod region, three in the Kharkov region, three in the Dnepropetrovsk region, three in the Nikolaev region, one in the Kherson region and one in the Odessa region. Tank lorries will take fertilizer from distribution outlets.

When the pipeline starts operating at capacity, it will be possible to supply collective and state farms with 250,000 tons of liquid ammonia a year, double the figure for the present. This growth in ammonia consumption is tantamount to the provision of agriculture with a million tons of nitrogen fertilizers a year (in terms of standard fertilizer).

Liquid ammonia has a number of valuable agronomic properties. It facilitates mechanization and precludes manual labor during fertilizer transportation and application.

Compared with solid nitrogen fertilizers, the manufacture of liquid fertilizers is 20 or 30 percent cheaper. Specific outlays for the construction of liquid fertilizer plants are reduced by nearly a third because they do not need departments turning liquid stuff into solid fertilizer.

In the near future the construction of storage facilities in a number of agricultural regions ought to be speeded up, as should be the output of equipment for the transportation and field application of anhydrous ammonia. It is necessary to expand the training of qualified cadres to work with the new type of nitrogen fertilizer. The agricultural agencies are called upon to come up with specific recommendations for the use of liquid

fertilizers in different zones as it concerns dosage, the relation of solid and liquid fertilizers, and so forth.

Occidental Petroleum Corporation and Williams Brothers (the USA) and Antrepose and Sofregaz (France) deliver equipment and pipes for the project under compensation agreements.

The Ministry of the Chemical Industry is the primary user of the ammonia pipeline, and it is responsible for the construction of the pipeline. The main contractor is the Ministry of Construction of Oil and Gas Industry Enterprises. A number of important jobs are being carried out by construction and installation organization of the USSR Ministries of Power and Electrification, Communications, and other ministries and departments.

A big volume of work has been done on the project started in 1977. It is necessary to raise the rate of work to commission the first and then the second phases of the pipeline as soon as possible.

Between Gorlovka and Odessa the erection of protective shore structures at major river crossings is not yet finished. The timetable for the installation of the ammonia pipeline's remote-control and monitoring equipment has not been maintained. Also proceeding slowly is the construction of housing for line personnel, as well as of buildings for repair shops and other service facilities in Nikolayev and Gorlovka. It is to be expected that the main administration for equipment supplying of the USSR State Committee for Material and Technical Supply should complete in the shortest possible time the delivery of the lacking equipment and cable product.

Simultaneously, it is necessary to step up the rate of construction and assembly work on the second phase of the ammonia pipeline leading from Togliatti to Gorlovka. The relevant organizations of the USSR Ministry of Building Enterprises of the Oil and Gas Industry must make a more effective use of their rich experience of building underground pipelines at the project to be commissioned soon.

The operation of the pipeline and its installations by the Ministry of the Chemical Industry is entrusted to the "Transammiak" Production Association. It is now obligated to better fulfill the functions of the user and to more energetically prepare itself for the opening of the pipeline.

CSO: 1821



## CONSTRUCTION, CONSTRUCTION MACHINERY AND BUILDING MATERIALS

### STATUS OF HOUSING CONSTRUCTION REPORTED

#### Fourth Year of Five-Year Plan

Moscow EKONOMICHESKAYA GAZETA in Russian No 28, Jul 79 p 1

[Text] Implementation of the grandiose program of housing construction planned by our party is an important factor for increasing the welfare of the Soviet people. It is planned to introduce 550 million square meters of housing during the Tenth Five-Year Plan, of more and better quality than during the Ninth Five-Year Plan. A total of 6,349,000 apartments with a total area of 322.5 million square meters was constructed during the period 1976-1978. Housing conditions were improved for 31.8 million persons, of which 23.5 million moved to new homes. The task of the five-year plan on introduction of housing due to state capital investments for this period has been completely fulfilled. More schools, kindergartens and children's institutions, hospitals and ambulatory-polyclinic institutions than planned were introduced during 3 years for state funds.

The state is taking upon itself the main expenditures related to housing construction. Four-fifths of all sources of housing construction financing are due to state capital investments. During 3 years 40.5 billion of 51.2 billion rubles directed to housing construction comprised state capital investments. Much housing is being erected from the economic incentives funds of enterprises and kolkhoz funds. Moreover, assistance is being rendered to housing construction cooperatives, which annually introduce on the order of 6 million square meters of housing. The initial contribution to ZhSK [Housing construction cooperatives] usually comprises 40 percent of the cost of an apartment. The remaining part is covered by a state credit. According to the 1979 plan, appropriations in the sum of 570 million rubles were allocated to housing construction cooperatives.

The fraction of the housing fund now exceeds one-fifth the cost of all basic funds of the country. During the past 15 years, the rates of growth far exceed the rates of increase of the urban population. As much housing sufficient for a city with 500,000 population is now being introduced within less than 1 month.



Capital investments to housing construction are as follows: 45.2 billion rubles in 1961-1965, 59.7 billion rubles in 1966-1970, 75.4 billion rubles in 1971-1975 and 85.7 billion rubles in 1976-1980 (planned). The figures for introduction of housing into operation comprised 490.6 million square meters of total area in 1961-1965, 518.5 million square meters of total area in 1966-1970, 544.8 million square meters in 1971-1975 and it is planned to introduce 550.0 million square meters of total area in 1976-1980.

The housing problem in the USSR is being solved in a complex manner and universally. Creation of new plants and reconstruction of existing plants result in development of an entire social infrastructure which includes housing, public and cultural-service objects. Housing construction is being carried out on a wide front in all the union and autonomous republics, krais and oblasts. Typical projects which take into account both natural-climatic and national-service traditions of a given locale are taken as the basis.

As can be seen from the given diagrams, the expenditures for all sources of financing on housing construction surpass the increase of introduced area. This is explained by the fact that ever more attention is now devoted in standard projects to housing quality. Houses constructed by the new standard projects have more convenient layout of apartments. The rooms, kitchens and other spaces in them are larger than previously constructed, the heat and sound insulation have been improved and the furnishings are better. As a result the estimated cost of the living area has increased by 15-20 percent, whereas apartment rent, as is known, remains unchanged.

Appearing before the workers of the Moscow Automotive Plant imeni Likhachev, L. I. Brezhnev noted: "Rent for housing and communal services does not cover even one-third of expenses for these purposes. Therefore, the state annually allocates approximately 5 million rubles for public housing management. We will proceed toward the same expenditures in the future as well."

The brigade contract method and the system of continuous planning and continuous construction of civilian housing objects according to the example of Orel builders, approved by the CPSU Central Committee, contribute to increasing the quality and reducing the periods of housing construction. In 1980, 75-80 percent of housing will be erected by brigade contract. The Orel "continuous method" will gain ever wider distribution.

New effective materials and structural members -- products of high-strength and light concretes, aluminum alloys and economic rolled steel sections -- are being introduced more and more extensively into housing construction practice. The palette of finishing materials is becoming more diverse. As a result, it is becoming possible to build cities and villages more originally and more expressive in the architectural sense.

Privileges to agricultural workers on payment of the cost of individual homes were established by the decree of the CPSU Central Committee and the USSR Council of Ministers "On further development of construction of individual homes and strengthening of cadres in the countryside," adopted in July 1978. Half of the total sum of credit will be expended due to the economic incentives fund of the sovkhoz or of the corresponding kolkhoz funds. The remaining part will be paid by the worker over a period of 20 years. Construction of engineering communications lines is provided at the expense of state and kolkhoz capital investments.

Capital investments for housing construction exceed 17.5 billion rubles for the 1979 plan among all sources of financing. A total of 112.3 million square meters of housing will be constructed, 3.8 million more than last year. The total length of water, sewer, heating and gas lines will be increased by 18,000 kilometers during the year. It is planned to construct preschool children's institutions for 506,000 seats and general educational schools for 1.1 million seats in 1979 at the expense of state capital investments.

#### Survey of Housing Construction

Moscow EKONOMICHESKAYA GAZETA in Russian No 28, Jul 79 p 2

[Text] More housing is erected every 2 years in our country than was erected during the entire urban fund of Russia prior to the Great October Socialist Revolution. The USSR occupies first place in the world on scales of housing construction, annually providing construction of homes with an area of more than 100 million square meters. Approximately 11 million persons improve their housing conditions during a year.

#### Both More and Better

The continuous increase in the volumes of housing construction is accompanied in our country by significant improvement of its quality. More than 40 percent of housing is now being erected by new standard designs and their fraction will reach 60 percent in 1980.

The task: "Increase the quality of housing construction, improve the comfort of dwellings and their layout. Carry out town construction according to general plans for urban development and improve organization of public services and amenities, the architecture of cities and other populated points."

"Increase the volume of cooperative housing construction. Assist in individual housing construction in small towns, settlements of the town type and in rural locales," posed by the Twenty-Fifth Party Congress, is being implemented successfully during the Tenth Five-Year Plan.

The homes of the new series are distinguished from their predecessors by more comfortable layout of apartments. The dimensions of rooms, kitchens and foyers have been increased in them. Engineering equipment has been improved. There are garbage chutes and elevators in multistory buildings. The heat and sound insulation of apartments has been intensified.

Construction mainly of one- and two-apartment homes with the entire complex of public conveniences is being introduced in rural locales. The areas of kitchens and related rooms for storage of provisions and clothing have been expanded in them and outbuildings for personal plots have been provided.

All this requires additional expenditures. Every square meter in homes of the new series is more expensive to the state, while mass conversion to them is being accomplished with an increase rather than a decrease in the scales of construction.

Ninety percent of new settlement families receive individual apartments. New standard designs have been developed for all natural-climatic zones of the country. The apartment furnishings take into account local demographic conditions.

The urban housing fund will be increased by 16-18 percent during the Tenth Five-Year Plan. Its area (with regard to removal of old buildings) will reach 2,170,000,000 square meters in 1980 -- approximately double that of 1965.

Important attention is being devoted not only to the quality of the buildings themselves, but also to providing them with an entire complex of public services. The housing in cities and working settlements has been completely electrified, 90 percent have been provided with water lines, 85 percent with central heating, 89 percent with sewer lines, 88 percent have been gasified and 58 percent receive hot water.

"Now when millions of people have already improved their everyday conditions, it is becoming possible to devote greater attention to the quality of construction, convenient layout of apartments and to the external appearance of streets, apartments and public buildings. Our architects can and should do away with monotony of construction and nonexpressiveness of architectural decisions," comrade L. I. Brezhnev pointed out. The next generation of standard designs is now being carried out. A further increase of area per resident is planned. Both rooms and outbuildings will become larger. Apartments will be supplied with built-in furniture. The entrances will have large foyers where bicycles and baby carriages can be left and where mobile shops can be organized. Rooms for self-service facilities and society work according to interests will be located on the first floors.

Improving the quality and increasing the comfort of housing without reducing the rates of erection indicate the increased economic might of our country and the continuous concern of the party and government about increasing the material and cultural level of the life of Soviet people.

#### Guaranteed by Law

The right to housing has been guaranteed by a Basic Law in our country for the first time in world history. Article 44 of the USSR Constitution states: "Citizens of the USSR have the right for housing."

"This right is provided by development and protection of the state and public housing fund, assistance in cooperative and individual housing construction, just distribution of housing area made available by implementation of the construction program of housing provided by public services and amenities under public control and also by the low rent for an apartment and public services. Citizens of the USSR should take care of the housing made available to them."

A complex of appliances with which modern apartments are equipped has become the norm. Moreover, the present engineering support of housing is incomparable to that existing previously both in quality and scales.

As is known, the state provides apartments free. The apartment rent for the entire complex of public services and the use of housing does not exceed an average of three percent of income in workers' families. They reach 20-30 percent in the capitalist countries. For example, a qualified worker is forced to spend one-third, and in the best case one-fourth of his wages in West Germany. Tens of thousands of apartments are empty in New York, London and Tokyo because they are beyond the means of simple workers.

It should be noted that payment of the population for housing and public services comprises less than one-third of the actual expenses for these purposes.

The housing fund is an important part of the national resources of a country. Active restoration and increase of it should be combined with concern about preservation and careful operation of housing and thrifty use of public services.

The regime of economizing on fuel and electric power, which has become the rule in industry, should be strictly observed in everyday life as well. Many losses occur due to unnecessary lighting and electric appliances operating needlessly. As indicated by investigations, 20-30 percent of the water in our cities is utilized inefficiently.

Public services are inexpensive and generally accessible and are provided by the state. And this must be reckoned. The ispolkoms of local soviets which regularly conduct public inspections of the state of the housing



fund are behaving properly and they follow careful operation of homes and apartments with the help of the most active members.

The experience of Leningrad, Novosibirsk and Ufa, which organized servicing of public housing facilities at a high level, indicates the need to concentrate the corresponding services and to create large specialized organizations involved in repair of the housing fund regardless of its agency affiliation.

Only 40 percent of the total housing fund is now administered by the ispolkoms of local Soviets. The remaining is administered by ministries and agencies. The experience of local Soviets which have centralized the entire housing fund into a single body indicates the advantages of this procedure. This makes it possible to better maneuver forces and funds within a regional framework and to provide economic and high-quality operation and maintenance of public housing management.

#### A Task of Primary Importance

As is known, large-panel house construction is the most massive and inexpensive. More than 400 enterprises are specialized in this. Their total capacity comprises 51 million square meters annually. For the most part, they are successfully assimilating the output of structural members and articles for homes of the new series.

The collectives of the Orel, Tallin, Alma-Ata, Moscow No 3, Kamchatsk, Donetsk and Mordovian House Construction combines, the Kishinevzhilstroy, Vinnitsazhilstroy and Ishimbaystroy trusts and the Khar'kovzhilstroy Combine are laboring excellently in construction of housing and cultural-service objects. They are successfully fulfilling the starting program and are turning over the majority of objects with high quality.

The builders of Moscow, Leningrad, Sverdlovsk, Murmansk, Olenok, Tomsk, Magadan, Sakhalinskaya Oblast, Primorskiy Kray, Udmurtiya and Yakutiya are stably fulfilling the plans for introduction of housing area. Extensive services belong in this to the ispolkoms of local Soviets, who have learned to organize clear rhythm of the construction industry.

At the same time, cases are being found of underutilization of state funds for housing construction and the plans for introduction of homes are being disrupted in some locations. This is specifically true of the Kursk, Novgorod and Astrakhan oblispolkoms and of the Councils of Ministers of Tatariya and Kareliya.

The results of 5 months of this year indicate that far from all organizations of Minstroy [Ministry of Construction] of the USSR, Minpromstroy [Ministry of the Construction Materials Industry] of the USSR, Minsel'stroy [Ministry of Rural Construction] of the USSR, Mintransstroy [Ministry of Transport Construction] and Minenergo [Ministry of Power and Electrification] of the USSR have taken the necessary tempo for successful fulfillment of the starting program of housing construction. The greatest lag has been permitted at objects being erected by order of Minpribor [Ministry of Instrument Making,

Automation Equipment and Control Systems], Minlegpishchemash [Ministry of Machine Building for Light and Food Industry and Household Appliances], Minnefteprom [Ministry of the Petroleum Industry], MPS [Ministry of Railways] and Minmorflot [Ministry of the Maritime Fleet]. The ministries should adopt urgent measures to bring order in this section of their activity.

The builders have still not been inspired everywhere with concern about increasing the quality of erected housing. Funds worth 2-3 percent of their estimated cost are now being expended on the premature repair of buildings. Checks organized by bodies of state architectural-construction control show that approximately one-third of the homes introduced at the end of the year have significant deficiencies in finishing. Material sanctions are applied to organizations which permit rejection and which do not provide high quality of housing construction.

A dependable means which guarantees fulfillment of the starting program and which provides for high quality of buildings is the system of continuous planning and continuous construction of civilian housing objects by the example of organizations of Orel. It has been distributed in many regions of the country. It is being used creatively at Donetsk, Dneprodzerzhinsk, Chernigov, Minsk, Alma-Ata and Baku. Turnover of housing for apartments was distributed in 1978 at Moscow, Orel and Murmansk in the following manner (in percent of the annual volume of introduction):

	I	II	III	IV
Glavmosstroy	20	25	26	29
Orel	20	26	25	26
Murmansk	10	31	24	26

High quality and operating efficiency of the builders also predetermined a clear rhythm. Unfortunately, this valuable experience is still not being utilized everywhere.

The services of a unified customer have not been organized in the proper manner and the "continuous construction" schedules have not been coped with at Astrakhan, Vologda, Vladimir, Nal'chik, Petrozavodsk, Makhachkala, Ivanov and Kirov. The gorispolkoms are slowly implementing the necessary measures here for introduction of this leading experience.

The fact that the length of erecting large-panel buildings was reduced by 10-15 percent at Omsk during 1977-1978 after implementation of "continuous construction" is indicative.

Concern about unconditional fulfillment of the housing construction plans and improving its quality should be constantly at the center of attention of local party and Soviet bodies as one of the most important constituent parts of the main task of the five-year plan.

## CONSTRUCTION, CONSTRUCTION MACHINERY AND BUILDING MATERIALS

### REVIEW OF INSTALLATION AND SPECIAL CONSTRUCTION WORK

Plan Fulfillment by Minmontazhspetsstroy

Moscow EKONOMICHESKAYA GAZETA No 29, Jul 79 p 1

[Article: "Installation and Special Construction Work"]

[Text] Improvements in the level of construction industrialization and in the degree of plant readiness of structures and parts and an expansion in the practice of completely prefabricated construction and in the erection of buildings and installations using progressive structures -- in the solving of these tasks, assigned during the 25th party congress, a worthy contribution is being made by the organizations of the USSR Ministry of Installation and Special Construction Work.

Under modern conditions, installation and special work constitute approximately 35 percent of the overall volume of industrial construction and at projects of the chemical, petroleum refining and a number of other branches -- 50-60 percent. The organizations of USSR Minmontazhspetsstroy [USSR Ministry of Installation and Special Construction Work] account for one fourth of the overall volume of construction-installation work carried out in industrial construction.

In the construction of industrial projects, the organizations of USSR Minmontazhspetsstroy install equipment, pipelines, metal and complicated reinforced concrete structures, they carry out electrical and heating installation, insulation and drilling and blasting work and they sink mine shafts and erect unique installations. For example, more than 3 million tons of steel metal structures, approximately 1.6 million tons of technological pipeline and 18 million square meters of air ventilation lines are installed annually.

On the whole, the organizations of USSR Minmontazhspetsstroy carry out the annual plans for construction-installation work. Any increase in the program is achieved by means of improved labor productivity. The following

diagram reveals that the annual volume of construction-installation work carried out by USSR Minmontazhspeetsstroy since the beginning of the five-year plan has increased by almost 1 billion rubles.



Key:

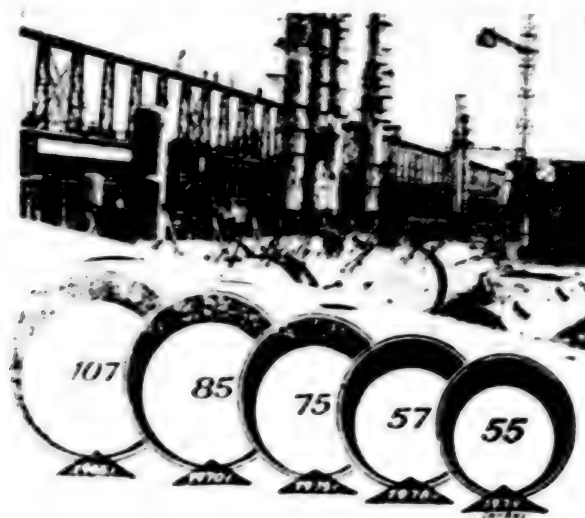
1. Volumes of construction-installation work carried out by USSR Minmontazhspeetsstroy (millions of rubles)

Industrial buildings encompassing an area of almost 30 million square meters have been erected and approximately 8 million tons of technological equipment were installed. Installation and special work were carried out very rapidly for blast furnace No. 9 and a complex for an oxygen converter department in Lipetsk, for the largest blast furnace in Krivoy Rog, for a converter department at the Azovstal' Plant, for "Atommash" Buildings and for KamAZ.

USSR Minmontazhspeetsstroy is developing its own production base and creating large inter-rayon enterprises. Plants for the production of metal structures have been placed in operation in such cities as Belgorod, Engel's and Tula



and also a number of other enterprises having highly productive equipment. More than 100 automated and mechanized production lines are in operation here. The proportion of automatic welding has been raised to 90 percent. During the past year the enterprises of the ministry produced almost 2 billion rubles worth of output -- roughly one fourth more than was produced in 1975.



Number of workers carrying out installation and special construction work (per 1 million rubles worth of work performed by organizations of USSR Minmontazhspestroy).

The USSR Ministry of Installation and Special Construction Work presently consists of 212 construction-installation trusts and associations, almost 2,000 installation and specialized administrations and more than 300 industrial enterprises. The overall number of workers attached to the USSR Minmontazhspestroy system is approximately 860,000.

The USSR Minmontazhspestroy system for training and improving the skills of workers and specialists makes it possible for these individuals to constantly improve their expertise. Each year, approximately 240,000 workers improve their professional knowledge in the training combines and directly in production operations. This has made it possible to raise the average qualification of the workers to the level of the fourth category.

During 1979, the greatest amount of installation and special construction work in terms of both volume and complexity is being carried out at projects of ferrous and non-ferrous metallurgy, chemistry and petroleum refining and the light and food industry. This year subunits of USSR Minmontazhspestroy are preparing to place in operation large capabilities for the extraction of iron ore at the Mikhaylovskiy and Lebedni mining-enrichment combines, for the smelting of steel at Lipetsk, coke batteries for 1 million tons of

output annually at Kemerovo, Zaporozh'ye and Avdeyevka. A pilot program that is unprecedented in scale is being carried out in the production of mineral fertilizers. Twenty one powerful synthetic ammonia units must be placed in operation, including at Tol'yatti, Gorlovka and Kemerovo

USSR Minmontazhspestroy has fulfilled its plan for the first 6 months by 103.6 percent. The planned goals for the first half of the current year were exceeded by the subunits of Glavmetallurgmontazh [Main Administration for the Installation of Metallurgical Establishments], Glavteplomontazh [Main Administration of Heat Engineering and Heat Insulation], Glavtekhmontazh [Main Administration for Installation in Chemical and Machinery Establishments], Glavmontazhavtomatiki and a number of other main administrations. The installation workers are carrying out their tasks in a diligent manner on the more important underway projects of the Tenth Five-Year Plan.

#### Installation, Special Construction Shortcomings

Moscow EKONOMICHESKAYA GAZETA in Russian No 29, Jul 79 p 2

[Article: "Installation and Special Construction Work"]

[Text] Specialized installation organizations play a great role with regard to the timely placing in operation of projects. A definite amount of work has been carried out by USSR Minmontazhspestroy in connection with improving the structure of these organizations and the methods for controlling them.

In addition to installation organizations, the specialized main administrations presently include planning and design subunits and industrial enterprises. This makes it possible to achieve complete solutions for complex production tasks, to realize improvements in the level of industrialization and to expand the scale of completely prefabricated construction and the installation of buildings using progressive materials and structures. During the past few years, the work directed towards eliminating those subunits which operate in parallel and regulating the network of organizations has made it possible to increase the capability of the trusts and industrial enterprises by an average of 15-20 percent.

#### Introduction of New Methods

A new branch of the construction industry -- plant construction of efficient and light supporting and enclosing structures made out of steel, aluminum and synthetic resins -- is undergoing development at the present time. The capabilities for producing coverings for industrial buildings made out of light metal structures has reached have reached 5 million square meters annually. By the end of the five-year plan, this figure will have been raised to 7.4 million square meters annually.

The use of such structures for erecting oxygen converter departments at the "Azovstal'," Novolipetsk and Zapadno-Sibirskiy metallurgical plants, production buildings of the Volgodonsk "Atomash" Plant and at other projects made it possible to lower the mass of the buildings by a factor of 4-6, raise the labor productivity of the installation personnel by 60 percent and reduce the construction schedules by 1.3-1.5 times.

The level of mechanized operations is increasing in a constant manner. The installation organizations are being equipped with such modern types of equipment as boom cranes having lifting capabilities of 160, 200 and 260 tons, mechanisms for lifting units weighing up to 1,000 tons, special motorized hydraulic lifts having a lifting height of 28 meters, conveyers for transporting cable drums and rolled billets for reservoirs, crane-drilling machines and other items of equipment. The overall number of self-propelled cranes increased by a factor of 1.5 since the beginning of the five-year plan and the machine-worker ratio for installation personnel -- by a factor of 1.3.

This made it possible to introduce on an extensive scale conveyer line assembly and installation of coverings for industrial buildings, using units having an area of up to 1,000 square meters and weighing 250 tons. On the conveyer line, simultaneously with the assembly of metal structures, the technological pipelines, air ventilation lines, electric current lines and lamps are installed in the inter-truss space.

Extensive use is being made of large-unit installation of technological equipment. For example, a converter which was assembled at the "Azovstal'" Plant into a unit weighing more than 1,000 tons was installed in its planned position in just 4 hours.

This year the method of installing technological equipment using assembled units is being introduced. Towards this end the technological equipment, pipelines, electric motors and measurement instruments are being installed on a rigid framework at the machine-building supply plant and the insulation is being completed. In short, the entire unit is being assembled completely. Thereafter, it is delivered to the site and installed in place. This method of installation reduces considerably the production work schedules and it raises by several times the labor productivity of the installation workers. The volume and cost of an installation are reduced owing to more compact placement of the equipment.

#### Reserves for Scientific Search

The work being carried out by 34 scientific-research and planning-design organizations of USSR Minmontazhspestroy and their branches is directed towards raising the efficiency of installation work. Recently, based upon the link that exists between science and production operations, extensive use has been made at the construction projects of laser control adjustments for foundations, new methods for carrying out electrical welding work,

special transport equipment for delivering large items of equipment to the installation zones and high quality heat-insulating materials.

The production of highly efficient profiles for the production of metal structures is being mastered at enterprises of USSR Minmontazhspetsstroy. At the Molodechno plant, for example, a mill has been placed in operation for the production of flex-welded closed profiles; it has a capability of 100,000 tons annually. When these are used in roof truss structures, the expenditure of metal decreases by 25 percent. In 1978, approximately 4,000 kilometers of glass pipeline was installed, thus making it possible to realize a savings of more than 45,000 tons of steel pipe, including 13,000 tons of non-corrosive metal.

Each ruble of expenditure for scientific-research and experimental-design work within the USSR Minmontazhspetsstroy system is being compensated by a savings of three and one half rubles in production, or one and a half times more than the savings being realized in other construction ministries.

At the same time, there are institutes within the USSR Minmontazhspetsstroy system which, in terms of their work, are not keeping pace with the modern requirements. For example, there is the VNIImontazhspetsstroy (Director B. Malyshev) Institute, the leading institute in the field of standardization, metrology and the mechanization of installation work. This institute is performing its obligations in a very weak manner and is not producing the required output. The GPIproyektmontazhavtomatika Institute (Director V. Kotov) is not devoting sufficient attention to improving the installation technology or the systems of control-measurement instruments and automatic control. Innovations are being introduced all too slowly into operational practice, particularly in the work being carried out by other institutes of USSR Minmontazhspetsstroy. In the interest of raising the effectiveness of scientific developments, the ministry must exercise strict control over the work of these institutes.

It bears mentioning that although USSR Minmontazhspetsstroy is coping with the plans for introducing new equipment into operations, these plans are not sufficiently tense. Within the overall program, the amount of work being carried out using leading methods and progressive technologies can and must be increased to a considerable degree. This is particularly important in view of the fact that at the present time USSR Minmontazhspetsstroy defines the principal trends for the technical development of installation and special work during the 1981-1985 period.

#### To Work Better and More Productively

Leading experience underscores the great opportunities that are available for raising production efficiency and the quality of installation work. High results are being achieved using the brigade contract method. Following adoption of this method, many collectives have entered the competition under

the slogan "The Five-Year Task of the Brigade -- With a Reduced Complement." Among the initiators of this patriotic movement, were -- Hero of Socialist Labor Yu.G. Shchekalev of the Uralstal'konstruktsiya Trust and electrical installer V.G. Nika of the Uralelektromontazh Trust. This initiative has been supported by more than 5,000 brigades. As a result, during just 1 year alone 6,000 workers became available for other duties and provided the foundation for the creation of 500 new brigades.

Well organized technical information and the propagandizing of leading experience are promoting to a considerable degree the development of creative initiative in the installation workers. In 1978, 446 patents were obtained by them. The USSR Minmontazhspetsstroy system includes approximately 100,000 efficiency experts and inventors. The economic effect realized from the introduction of these proposals amounted to approximately 200 million rubles in 1978.

The mass socialist competition combined with the introduction of scientific and engineering achievements into production operations is bringing about a reduction in the duration of technological equipment installation work.

From year to year the Vostokmetallurgmontazh and Soyuzprombunmontazh trusts and also Trust No. 7 (directors F. Korol', B. Ushakov and V. Lykhov) are fulfilling their plans for work volumes, for placing especially important industrial projects in operation, for raising labor productivity and for other indices. The group of leading industrial enterprises includes -- the Chelyabinsk Metal Structures Plant and the Bataysk Plant for Reservoir Structures (directors I. Pikhulya and N. Nepokrytykh).

At the same time, unsatisfactory work is being performed at the Dal'tekhmontazh (Director V. Andreyev), Tsentrrotekhnmontazh (Director I. Chumadin) and Sibneftekhnmontazh (Director B. Gataullin) trusts. Despite having been supplied with modern equipment, the Tula (Director G. Lashnev) and the Kulebaki (Director Yu. Mashkov) metal products plants have fallen behind. Here the losses in working time and in mechanism and equipment idle time are great, production and labor discipline are low and engineering and work personnel are being employed in an unsatisfactory manner.

Such shortcomings in the organization of production operations and labor also exist in a number of other organizations and enterprises. This is partly explained by the fact that USSR Minmontazhspetsstroy places almost 16 percent of the projects in operation at times that are considerably later than those called for in the plans. As mentioned earlier, USSR Minmontazhspetsstroy on the whole fulfilled its program for the first 6 months. The goals planned earlier for this period were surpassed by Minmontazhspetsstroy organizations in the Ukraine, Kazakhstan and Belorussia, by Glavmontazhspetsstroy organizations in Georgia and Azerbaydzhan and by an overwhelming majority of the branch main administrations. At the same time, the following organizations are lagging behind in their plan fulfillment:



Minmontazhspestroy of Uzbekistan (Minister Kh. Shagzatov), Glavmontazhspestroy of Armenia (Chief G. Gambaryan), Glavspetspromstroy (Chief I. Sadamchuk) and Glavstal'konstruktsiya (Chief A. Orlov). The six month task for raising labor productivity and producing metal structures was underfulfilled.

Nor can we tolerate a situation wherein almost one half of the trusts are not fulfilling their sub-contracting plans for the principal construction ministries. USSR Minmontazhspestroy is not fully utilizing the capital investments being made available to it for developing its own production base. The capabilities of a number of large industrial enterprises are being developed slowly, particularly plants engaged in the production of light steel structures, which are being employed to only 60 percent of their capability. A great amount of manual labor is being employed for the carrying out of sanitary engineering, insulation, chemical-protective and electrical installation work. A requirement exists for accelerating the conversion over to complete deliveries of structures for industrial buildings. The technical achievements of USSR Minmontazhspestroy will produce greater results if they are fully taken into account by the customer-ministries and their institutes when planning the technical processes and the industrial buildings.

Recently, improvements have been realized in the quality of the metal structures and the schedules for producing them have been reduced. But the difficulties and reductions in the work being performed by the metal structures plants are often caused by the suppliers of the rolled metal, particularly by the Nizhne Tagil' and Karaganda combines and the Azovstal', Imeni Il'ich and Kommunarskiy plants. During the first half of this current year, they fell behind in their obligations by tens of thousands of tons of rolled metal.

At the same time, more than 800,000 tons of rolled metal are to be found at the construction sites. A large front of work calling for the installation of 500,000 tons was presented 2-6 months late and as yet not even the foundations have been prepared for the installation of 400,000 tons. A lack of coordination of the work being carried out by the general contractors and the sub-contracting installers is clearly evident. The latter have submitted just complaints to organizations of USSR Ministroy (Ministry of Construction) concerning construction projects in Novgorod, Dorogobuzh and Al'ayskiy Kray, to organizations of USSR Minpromstroy (Ministry of Industrial Construction) -- concerning construction in Permskaya Oblast and to organizations of USSR Mintyazhstroy (Ministry of Heavy Construction) -- concerning construction in Kemerovskaya Oblast.

The most important task confronting the collectives of installation workers is that of further raising labor productivity based upon technical progress and improvements in the organization of production and labor. USSR Minmontazhspestroy has all of the opportunities at its disposal for performing in a better and more productive manner.

## CONSTRUCTION, CONSTRUCTION MACHINERY AND BUILDING MATERIALS

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### REDUCING LEVEL OF UNFINISHED CONSTRUCTION DISCUSSED

Moscow EKONOMIKA STROITEL'STVA in Russian No. 7, Jul 79 pp 34-37

[Article by A.P. Lifatov, honored builder of the RSFSR: "Lowering the Level of Unfinished Construction"]

[Text] The tremendous volume of capital construction carried out in the USSR has provided the country with scales and rates of growth for industrial production, for agricultural development and for the level of well-being of our Soviet people that were unthought of earlier.

During 3 years of the current five-year plan alone, the volume of capital investments amounted to 367 billion rubles and more than 700 large industrial enterprises were built and introduced into operations. Each year a large number of installations are being placed in operation for the population. For example, during 1978 alone the following facilities were built and placed in operation: 109,000 square meters of housing space; children's pre-school institutes for 617,000 children; schools for 1.5 million students; hospitals for 64,000 beds, 116 domestic services facilities; clubs, theatres and palaces of culture for 27,000 individuals. But these successes could have been even greater if certain serious shortcomings in capital construction had been eliminated. These shortcomings were mentioned during the November (1978) Plenum of the CC CPSU by the General Secretary of the CC CPSU and Chairman of the Presidium of the USSR Supreme Soviet, Comrade L.I. Brezhnev.

One principal shortcoming is that of non-fulfillment of the tasks for placing capabilities and projects in operation. This has led to an increase in the volume of unfinished construction, immobilization of resources for extended periods of time and to increased construction costs.

Here are some examples of construction operations that have been delayed compared to the norms: a meat processing plant in Surgut in Tyumenskaya Oblast, a brewery in Sochi and a baking-confectionery combine in Kostroma. Violations of the norms for the duration of construction operations in cultural-domestic construction have become common phenomena. Here, as is

well known, the tasks with regard to placing projects in the national economic plans in operation are established only for the customers. An inspection revealed that this is caused mainly by non-fulfillment of the construction plans by the sub-contracting organizations.

A serious shortcoming in capital construction is the systematic changing of estimated costs which, in a number of instances, has reached considerable proportions. This disrupts the planned estimates and the organization of construction production and quite often it leads to an increase in the volume of unfinished construction.

During the 1977-1978 period, USSR Stroybank conducted a check on 33 large construction projects in the RSFSR, the overall estimated cost of which was approximately 5 billion rubles. This check revealed that the estimated cost had increased by 1.9 billion rubles, or 39 percent, above the figure in the approved technical documentation, including for construction projects of Minchermet -- 433 million rubles (32 percent), USSR Minenergo -- 133 million rubles (63 percent) and USSR Minkhimprom -- 164 million rubles (40 percent). For example, an increase in the estimated cost of construction for the Lebedyan' GOK [Mining and Concentration Combine] of USSR Minchermet amounted to 127 million rubles, with 23.7 million rubles of this increase being caused by planning organization mistakes.

The increase in the volume of unfinished construction, compared to the established norm, appears to be the result of a number of factors. One of the principal causes of the increase in the volume of unfinished construction was the incorrectly composed plan for capital investments and construction-installation work and the fact that it was not coordinated with the schedules for obtaining the planning-estimates documentation and all types of material and technical support or with the capabilities of the construction organizations and their production base. At the present time, with the planning and economic organs commencing the preparation of materials for the Eleventh Five-Year Plan and for 1980, a review must be undertaken of all of the measures required for reducing the volume of unfinished construction and bringing the figure to the normative level and for eliminating in particular the vicious practice of dispersion of capital investments. In order to achieve this, it is our opinion that the following decisions must be adopted.

The planning and economic customer-organs must observe in a strict manner the methodological instructions of USSR Gosplan for composing a state plan for developing the national economy of the USSR, since as yet many statutes of this important planning document are not being carried out.

It is stipulated in these instructions that when developing tasks for placing fixed capital in operation, a determination should be made as to the volume of unfinished construction at the beginning and at the end of the planned period, the structure of the unfinished construction should be analyzed and measures should be planned for accelerating the placing in operation of production capabilities and projects and reducing the volume of unfinished



construction. When establishing the tasks for placing capabilities and projects in operation, the volume of unfinished construction is dependent upon the estimated costs and duration of construction for the enterprises, projects and installations and also upon the distribution, by years in which the construction of enterprises takes place, of capital investments and the partial placing in operation of fixed capital. A principal measure for reducing the volume of unfinished construction is that of reducing the duration of construction operations. Towards this end, the plan must call for a concentration of capital investments, material resources and financial means for the construction of underway and important projects and complexes, while ensuring that these resources are not dispersed among numerous projects undergoing construction at one and the same time.

In order to ensure the carrying out of this instruction, the USSR ministries and departments and the state planning committees for the union republics, upon receiving control figures from USSR Gosplan in May of the year preceeding the one being planned, must develop their own draft plans and, in our opinion, present them to USSR Gosplan prior to 15 August. The expected results set forth in these draft plans and computations should equal the planned results. However, based upon the operational results for the first three quarters and taking into account the availability and arrival of equipment, the actual data introduced by USSR Gosplan into the plans prior to their approval by the government must be defined more exactly prior to 20 October. In addition to the customer and contracting party, a number of other elements must necessarily participate in the work of defining the draft plan more exactly: kray and oblast offices of USSR Stroybank and USSR Gosbank and people's control committees, not to mention the fact that the local party organs will exercise control over the preparation of the draft plan. This method eliminates the need for re-examining or defining the plan more precisely during the first quarter of the year being planned. The possibility is excluded of additional resources being made available for new projects and conditions are created for ensuring that the contractual campaign for contractual work is completed in January of the year being planned.

Moreover, a system must be established whereby the contractual construction ministries will undertake to issue reports on the coordination of the contractual work plans, signed in the various areas by the customers and directors of their territorial main administrations (administrations, associations) for construction.

The planning and construction for approved underway complexes must be carried out completely and without exception at the sites of the individual projects. In actual operational practice, the work of building fixed production installations is often accelerated, while a sharp lagging behind is noted in housing-municipal and cultural-domestic construction and at times in projects of an auxiliary nature and nature protection facilities.

Many examples could be cited showing how, at the moment that capabilities are turned over for operation, the resources for productive construction are being used 90-100 percent and for non-productive construction projects --

only by 30-40 percent. As a result, there is a shortage of workers at an underway complex owing to the absence of housing, childrens' institutes, polyclinics and other non-productive installations. It is for this reason that the customers, quite properly, decline to accept into operations completed productive installations and thus such installations continue to be considered as unfinished construction. The example of the Kursk Chrome Leather Plant is rather significant in this regard. It was being built by USSR Mintyazhstroy and yet when the time came for turning it over for operation it was discovered that one and a half more years were required to complete the construction of the purification installations. Many similar incidents could be cited.

The responsibility of the planning organizations, the customer and the contractor for the quality of the complexes under construction must be raised and individuals must be held personally responsible for the status of the projects at each complex.

At the present time, the plans of contracting organizations include only tasks for placing productive capabilities in operation. All projects of a non-productive nature: housing, schools, childrens' institutes, domestic services facilities, municipal networks, water intake and purification installations directly associated with ensuring the use of these capabilities are included only in the plans composed by a contractor for placing projects in operation. Moreover, the projects are included in these plans in a manner such that the volumes and schedules for this type of construction (its proportion within a plan amounts to more than 30 percent and for the councils of ministers of union republics and a number of branch ministries -- more than 50 percent) must be determined at the sites on the basis of contractual agreements with the organizations. In actual practice, this leads to the availability of two plans for these projects and to considerable growth in unfinished construction. It is our opinion that the proposals for also including tasks for the placing in operation of non-productive projects in the plan for contracting organizations, by analogy with the tasks for placing public health projects in operation, should ideally be re-examined.

The operational plan for USSR Minmontazhspetsstroy must call for the placing in operation of both productive and non-productive projects, since the installation organizations of this ministry report only on the overall volume of construction-installation work carried out on the basis of a sub-contract.

Ideally, a ban should be placed on including in the capital investment plans, for at least the following 2 years, the construction of new industrial projects having an estimated cost of 1 million rubles or more, without the permission of the USSR Council of Ministers but adopted based upon presentation by the higher planning organs.

The plan for 1980 and subsequent annual plans for capital investments should include only those projects having properly approved technical documentation

for the situation on 1 July of the year preceeding the one being planned and prior to 1 August of the year preceeding the one being planned -- confirmation by the completion organizations of the volumes and schedules for the deliveries of technological and completion equipment.

Control over the carrying out of these requirements should be assigned to USSR Stroybank and USSR Gosbank and their organs in the various areas. The introduction of these limitations provides still another barrier against the dispersion of capital investments and growth in the volume of unfinished construction.

It is our opinion that the timely placing in operation of capabilities and projects is being impeded by two presently active statutes concerned with supplying construction projects with certain materials and equipment. This includes customer deliveries to the construction sites of pipe, track, crossties, cable products, starting and stopping control equipment, fans and so forth and the planning of pipe and equipment deliveries not only for special construction projects but also for those planned for placing in operation during the current year. Both statutes serve as a source for misunderstandings at the construction projects and lead to an increase in the volume of unfinished construction.

It is our opinion that the existing method for providing support to construction projects should be re-examined and that, commencing with the material-technical supply plan for 1980, all types of materials, rolled metal, pipe, track, crossties, starting and stopping control equipment, fans and other equipment being supplied at the present time by the customers, with the exception of technological and completion equipment (including bridge cranes) and boilers for boiler rooms, should be allocated directly to the contracting construction ministries and departments.

In addition to bringing about a considerable reduction in the number of administrative-economic personnel and in the expenses for maintaining the warehouse facilities of the customers and suppliers, with a certain increase in the number of workers attached to the supply organs of construction organizations, the carrying out of this proposal will also make it possible to eliminate the many lawsuits raised in many areas by representatives of the customer, contractor and sub-contracting installation organizations, lawsuits which in many instances cause delays to ensue in the placing of projects in operation.

The existing system for allocating pipe, track, boilers and technological equipment during the year in which capabilities and projects are placed in operation leads to a situation wherein the majority of the projects are planned for introduction during the second half of the year and more often than not in the fourth quarter, since the equipment deliveries, including boilers for the boiler rooms, are at best planned for the 2d and 3d quarters of this year. If there are frequent instances of disruptions in

the equipment delivery schedules, it will be impossible to place the projects in operation in accordance with the established schedules, the amount of unfinished construction will increase and greater quantities of uninstalled equipment will accumulate at the warehouses.

In order to improve considerably the situations at the construction projects, it is our opinion that the planning organs, commencing with the plan for 1981, must change the existing system for allocating pipe, track, boilers and technological equipment, such that this equipment is issued in the required volumes for projects to be placed in operation during the coming year as well as the current one.

In view of the difficulties being encountered in supplying the construction projects with boilers, pipe and a number of other items, a logical action would seem to be that of reducing the number of newly begun construction projects, since this undoubtedly will create conditions for ensuring the uniformly rhythmic placing of projects in operation.

Growth in the volume of unfinished construction is affected by various "refinements" in the estimated cost of construction, carried out for many construction projects. Moreover, it should be pointed out that these "refinements," which as a rule tend to increase the estimated cost, are carried out with impunity by individuals who made mistakes in their estimates. At a number of construction projects, these "refinements" are not being carried out in a sufficiently sound manner.

In the interest of curtailing illegal increases in estimated costs, it is our opinion that the banks should be prohibited from making long term investments in connection with the financing of technical documentation associated with increasing the estimated costs for projects, in the absence of an order from the element which approved the estimate and with specific decisions with regard to punishing those individuals and organizations guilty of tolerating mistakes in their estimates.

In resolving the problem of including new construction projects in the plan, the amount of a future increase in estimated costs is not taken into account, since this is one of the factors which caused a delay in the construction work.

In order to be restored with regard to unfinished construction, the customers and contractors must employ the norms for construction duration in their planning computations in a very strict manner and USSR Gosplan must be authorized to accept for approval or to present to the government title lists which were composed only in conformity with these norms, even in the presence of objections by the contracting ministries. The latter are obligated, jointly with the customers, to take advantage of all available opportunities and to undertake the measures required for ensuring the fulfillment of these plans. In the absence of such strict exactingness for



ensuring the placing in operation of capabilities and projects, in conformity with the norms for the duration of construction work, difficulties will be encountered in attempting to restore order in the planning and carrying out of construction work.

Beyond any doubt, if this is to be accomplished then the customer must furnish everything that is required of him in a timely and complete manner and the planning organs must furnish him with the necessary assistance in supplying the individual construction-installation organizations with mechanisms and equipment and allocating workers from among those being paid by GPTU, orgnabor [Department for the Resettlement and Organized Recruitment of Workers] and other sources.

It is our opinion that proper note must be taken of the existing situation wherein, during the 4th quarter of each year, all of the USSR ministries and departments and the councils of ministers for the union republics are authorized to redistribute funds among the branches and projects based upon the operational results for the first through the third quarters of the current year. This serves only to increase and legalize the dispersion of resources. When composing the internal construction title lists, such a system results in understating the volumes required by the projects. When the plan for these projects is over-fulfilled, payments will be made for the work carried out and yet thereafter the customer in return will be supplied with additional resources for commencing the construction of new projects and this leads only to an increase in the volume of unfinished construction.

Instead of the above system for distributing resources, it is our opinion that USSR Minfin [Ministry of Finances], together with USSR Stroybank, USSR Gosbank and the councils of ministers for the union republics, based upon the results for the year planned but no later than 15 January of the following year, should be authorized to carry out the necessary refinements in the financial mutual accounts among the customers, contractors and suppliers. Such a solution for the problem will make it possible to decrease the dispersion of funds in construction and to retain in the budget those funds which are being spent by the ministries, departments and the executive committees of local soviets in payment for the various types of equipment, which as a rule is not included in the estimates for the construction projects and other expenses.

In order to decrease the volume of unfinished construction and prevent the dispersion of resources, interest must also be created among the labor collectives and executive agents in fulfilling and over-fulfilling the established plans for placing capabilities and projects in operation. We are of the opinion that this effective measure is still not being employed adequately in construction and that it is deserving of greater attention. As mentioned by Comrade L.I. Brezhnev during a meeting with voters in the Baumanskiy Election District in Moscow, "...a requirement also exists for reorganizing planning and managerial methods and also the system of indices and material incentives. Regardless of how complicated this reorganization may be, we cannot proceed without it."

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## CONSTRUCTION, CONSTRUCTION MACHINERY, AND BUILDING MATERIALS

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### WAYS TO RAISE LABOR PRODUCTIVITY IN CONSTRUCTION OUTLINED

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[Article by V. G. Ivanov, Deputy Chairman of USSR Gosstroy: "Use Completely the Reserves for Growth in Labor Productivity"]

[Text] "One of the main prerequisites to implementing plans for the proportional development of the Soviet economy," it was observed in the decisions of the 25th CPSU Congress, "is the rational use of labor resources and steady growth of labor productivity."

A rise in labor productivity is of especially great importance when there is full employment, a curtailment in the growth of labor resources, and a necessity for further expansion of the services sphere.

As Comrade L. I. Brezhnev pointed out at the November 1978 CPSU Central Committee Plenum, "...it is necessary to render greater support for intensive factors in economic growth, since other factors are shrinking rapidly."

A considerable rise in labor productivity plays a paramount role in construction. All growth in construction and installing work volume during the five-year plan and the release of a portion of the workers should be provided for here on the basis of the pace of growth of labor productivity.

Construction is a huge industrialized sector of the national economy. The developing network of contracting construction organizations and construction-industry enterprises is capable at present of successfully solving the major tasks of the country's economic and social development. Proof of this is the annually increasing program for construction and installing work. During 1951-1978 the annual volume thereof increased about 10-fold. Output per worker rose almost 5-fold, and worker manning per computed million rubles' worth of work performed was reduced from 342 persons in 1950 to 76 persons in 1978, thanks to which the labor of more than 20 million workers was saved, the pace of construction and installing work increased, and operating costs therefor were reduced.



However, the considerable gap between construction plans and their execution remains, as was noted at the November 1978 CPSU Central Committee Plenum. Intensive factors for developing construction operations still are not being used actively, and this finds expression in the most important indicator of its effectiveness--labor productivity.

Labor productivity grew by only 8.5 percent during 1976-1978 instead of the 15.8 percent planned. A lag was permitted in organizations of USSR Minpromstroy [Ministry of Industrial Construction], USSR Minstroy [Ministry of Construction], USSR Mintyazhstroy [Ministry of Construction of Heavy Industry Enterprises] and USSR Minsel'stroy [Ministry of Rural Construction].

Given the modern scale of construction operations and the level of its supply-and-equipment base, there are major unused reserves for raising labor productivity, as indicated by an analysis of progress in five-year plan fulfillment. The most important of these are acceleration of the pace of scientific and technical progress and the achievement of new quality of work in the areas of construction science, equipment, design, organization and management.

Some of the main factors in labor productivity growth in construction are a rise in the degree of prefabrication in construction, wider use of progressive constructional structure and effective materials, and improvement in three-dimensional layout and design solutions. As a result of using all this potential, labor productivity during the five-year period should grow by 10 percent in accordance with the plan, including 4.8 percent in 1976-1978. However, actual growth during this period proved to be about 2.9 percent. What are the reasons for this?

Fully prefabricated construction and large-panel and three-dimensional modular housing construction occupy an important place in the industrialization of construction work, which aids labor productivity growth.

Even today construction manning can be reduced by 2,800 workers per year per computed million square meters of total area in the erection of large-panel and three-dimensional modular apartment houses instead of using brick, or by 9,100 persons per year by erecting wooden-panel housing instead of paving-block housing. However, this potential is not being used completely because of nonfulfillment of goals for developing fully prefabricated construction and for raising the technical level of the operations.

Thus, in 1978 the goal for fully prefabricated construction, as called for by the plan for new techniques, was met by only 98.4 percent, the goal for large-panel and three-dimensional modular housing was met by 96.9 percent, the goal for manufacture of glued-wood structure by 99.6 percent, and of large-sheet asbestos-cement enclosure structure by 95.1 percent, and the goal for the manufacture of reinforced-concrete structure by the shock method was met by 91.8 percent. Nonfulfillment of these goals is explained not only by deficiencies in providing the industry with material

resources, to which the builders constantly refer, but by ineffective use of the potential of the production base of contracting organizations. In 1977, for example, large-panel housing-construction plants of USSR Mintyazhstroy were working at only 79.3 percent of capacity, those of USSR Minpromstroy at 79 percent, USSR Minstroy 78 percent, Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] 76 percent, Kazakh SSR Mintyazhstroy 68 percent, Moldavian SSR Minstroy 51 percent, Tadzhik SSR Minstroy 53 percent, and Moldavian SSR Minsel'stroy 42 percent.

Advanced domestic experience, world construction practice and research by scientific organizations confirm that construction operations should be developed along the path of transforming them into the process of assembling buildings and structures from completely readied structure and parts and the installation of operating and engineering equipment that is sent to the construction project in completely outfitted factory-made components and large modules. In so doing, all labor-intensive processes, such as the finishing work on buildings and final refinement and adjustment work on structure and articles, should be done not at the construction projects but under factory conditions. In order to make this reduction in labor expenditure at construction sites and to raise labor productivity, builders need effective, highly industrialized articles and structure completely readied at the factory. However, the requirement for these items is far from being completely satisfied at present.

Thus, in 1976-1978 construction was supplied with only 62 percent of the aluminum structure, 78 percent of the plastic pipe, 85 percent of the effective roofing materials, 69 percent of the metal structure for industrial-building roofing, 91 percent of the enclosure structure made of lightweight and cellular concretes, and 93 percent of the building roofs fully readied at the factory that were called for by the five-year plan.

The builders still do not have a potential for the broad use of certain effective types of rolled metal. Actually, the demand therefore is the same as in 1970. A contradiction occurs: each year the appropriate USSR Gosplan sections plan a sufficiently high share for the use of highly effective metals in the reinforced-concrete industry, but in practice other sections of USSR Gosplan and USSR Gosstrib allot A-III and A-V steel and other nonprogressive materials to construction projects. Use of the most effective reinforcement steel--low-carbon and high-strength wire--was even reduced in 1978 in comparison with 1970 (from 23.2 tons per million rubles' worth of construction and installing work to 16.3 tons, and from 3.4 tons to 2 tons, respectively).

A number of progressive materials still are not being manufactured at all, especially for thermal and acoustic insulation and for finishing work. The goals set by the 25th CPSU Congress for further developing and improving the industry that makes building materials and constructional structure and parts are being met with insufficient responsiveness by ministries and agencies. The funds allocated are directed preferentially to the creation of capacity for the output not of new and progressive but of traditional materials and articles.

Design organizations should make their contribution to raising the level of industrialization in the erection of buildings and structures and, as a result thereof, to reducing construction's labor intensiveness, by using the latest achievements of science and technology and of advanced experience in design and budget-estimating documentation. The fact that the achievements of scientific and technical progress still are not being introduced adequately attracts attention. As indicated by an experiment in determining the effect of introducing the achievements of science and technology on the builders' labor productivity that was conducted by USSR Minneftegazstroy's VNIIST [All-Union Scientific-Research Institute for the Construction of Trunk Pipelines], many unresolved problems still face the designers. Thus, out of 38 design institutes that participated in the experiment, 20, it was revealed, did not call for the use of new technology that helps to raise labor productivity in the jobs that were included in the experiment. These institutes included organizations of USSR Minchermet [Ministry of Ferrous Metallurgy], Minkhimprom [Ministry of Chemical Industry], USSR Minenergo [Ministry of Power and Electrification], USSR Ministry of Culture, RSFSR Gosstroy, Belorussian SSR Gosstroy, and Gosgrazhdanstroy [State Committee for Public-Building Construction and Architecture].

When designing improved series of apartment houses, the designers often permit a substantial increase (of 20-30 percent) in the labor intensiveness of construction, mainly because of the manual labor required for finishing work and for executing architectural decor.

These facts indicate that the results of design have not been made to depend completely upon the use of the new achievements of construction science and technology. The existing system of material incentives does not motivate designers in due measure to reduce labor intensiveness or to raise labor productivity at the job site. Radical improvement is necessary in methods for motivating the activity of design organizations that are aimed at raising the technological effectiveness of design decisions and the use therein of new and effective materials and structure that will provide for a considerable reduction in manual labor.

Scientific-research and design organizations should develop and master methods for the optimization of design solutions over numerous parameters, that will provide for a choice of variants with the prescribed or improved operational characteristics at minimal expenditure of labor and that will provide for a reduction in construction time.

A policy for effectiveness is inseparable from an acceleration of scientific and technical progress, it was noted at the November 1978 CPSU Central Committee Plenum. Construction science has an important role here.

In accordance with the CPSU Central Committee and USSR Council of Ministers decree, "Measures for Raising the Effectiveness of Scientific-Research in the Area of Construction, Architecture, Building Materials, and Construction and Road Machine Building and for Accelerating the Introduction of Scientific Achievements into Construction Practice," USSR Gosstroy,

Union-republic gosstroy, and ministries and agencies are required to improve the organization of scientific research in order to increase the effectiveness of the activity of scientific institutions and scientific subdivisions of higher educational institutions that are working in the areas of construction, architecture, building materials and construction and road machine building. It is necessary to intensify the role of science in solving the basic tasks that were set by the 25th CPSU Congress for capital construction--to provide for a further rise in its effectiveness and, consequently, for the most rapid introduction into operation of new production capacity, for a reduction in the time taken to assimilate that capacity, based upon improvement in planning, design and work organization, and for a reduction in the cost of and improvement in the quality of construction.

Because of the intensive development of industry and construction in the country's northern and eastern regions, construction science should make its contribution to the creation of three-dimensional layout and design solutions for buildings and structures that will accord with the peculiarities of construction where there is a severe climate, seismicity, permafrost or loesslike, subsidant, saline or other soils. Structure for such buildings and structures should be technologically effective and suitable for transporting and erection and should require minimal labor expenditure at the job site.

In order to develop and select optimal design solutions, the scientific-research and design institutes of USSR Gosstroy and the construction ministries and agencies should pay greater attention to the broad use of the methods of mathematical economics and of computers in design and should assimilate methods for automated design more actively.

An increase in productivity of labor is continuously associated with a rise in the level of its mechanization.

The fleet of construction vehicles and machines is growing at a rapid pace. However, the potential for mechanization and automation of construction and installing work still is not being used completely here by far. Therefore, labor productivity for the first 3 years of the five-year plan increased because of the rise in level of the mechanization of construction by only 2.5 percent instead of 5.2 percent (it should grow by 9.5 percent during the five-year plan).

Industry still is not providing construction operations adequately with more progressive machines and mechanisms.

This situation can be corrected by equipping construction with highly productive machines and transport equipment of higher power and load-carrying capability and with machines that will enable manual labor to be precluded and, consequently, the level of construction and installing operations to be raised. Supplying builders with mechanized tools and minor mechanization equipment should play an important role in the solution of this problem.



However, each year contracting organizations continue to receive low-powered and, often, obsolete machines. Their use increases the number of operators but does not provide for due growth in labor productivity for mechanized operations. The average power and capacity of machines have practically not grown in recent years. Thus, the average bucket capacity of excavators in contracting construction work at the start of 1978 was 0.51 cubic meter, while at the start of 1976 it had reached 0.493 cubic meter, the capacity of scraper bowls had reached, respectively, 5.5 and 5.52 cubic meters, and the average power of bulldozers was, respectively, 93.2 and 95.2 horsepower. The average load capacity of trucks under contracting organization jurisdiction was 5.37 tons instead of the required 7.5. The number of trucks with load capacities of 2.1-5 tons reaches 65 percent of the total number, when the optimal requirement for them is 30 percent.

Each year the number of machines per computed million rubles' worth of construction and installing work is reduced. Because of this, construction organizations are compelled to use machines whose service lives have long since expired. There are now substantial numbers of single-bucket excavators, bulldozers, scrapers, truck cranes and trucks with expired service lives in contracting organizations.

The large number of obsolete machines and inadequate satisfaction of the builders' requirements for spare parts, operating equipment and a repair and maintenance base tell negatively on equipment utilization indices and lead to increased labor expenditure for keeping the machines in efficient condition.

About 350,000 people are now engaged in the technical servicing and repair of construction machines. In order to reduce the manning thereof and, as a result of this, to raise their labor productivity, it is necessary to centralize the repair of equipment and to reduce in every possible way the volume of capital repair of complicated machines in small servicing shops that are not adapted to this purpose. And this is a task for the construction ministries. One cannot be reconciled to the fact that about 31 percent of the production volume at construction ministry repair plants is taken up with the repair of construction equipment and the rest of it goes to activity that does not correspond directly with the enterprise's mission.

Contracting organizations themselves have at their disposal major reserves for improving the use of construction machines. These reserves are concealed primarily in the reduction of idle time for machines and mechanisms. Half of all idle machinery time, as selected observations indicate, is occasioned not just by malfunctions but also by the lack of a work front and by violations in labor discipline.

A most important task, on the correct solution of which growth of labor productivity in construction work during the current five-year plan depends, as has been pointed out repeatedly, is a reduction of manual labor. The level thereof in the main types of construction and installing

operations continues to be high, especially in concreting, plastering, painting, masonry, roofing and carpentry work. Along with the necessity for a sharp reduction in the volume of wet processes and other labor-intensive operations at the construction site, the allocation of progressive mechanized and manual tools to construction workers is of paramount importance. Contracting organization requirements for manual tools is being satisfied by only 30-35 percent. By the end of 1978 there was an average of 0.14 electrical tool per worker, versus the norm of 0.45, and 0.022 pneumatic tool versus the norm of 0.25.

The low quality of tools delivered by industry restrains the pace of labor productivity growth. This reserve in labor productivity growth in construction is assessed at no less than 10-15 percent. The fabrication of these tools under construction-site conditions leads to a further increase in worker manning. However, even the available mechanized tools are not being used completely because of a lack of spare parts and of current-frequency converters (the demand for them is being met by only 21 percent) and a negligent attitude toward such tools.

At the modern stage of development of the economy, it is becoming increasingly necessary to mobilize the enormous reserves that are included in improvements in the organization of the management structure and in use of the great potential for optimizing the economic mechanism.

It was planned to achieve in 1976-1980 a labor productivity growth of 10.8 percent, including 5.8 percent in 1976-1978 by improving the organization of work and management in construction. Actually, labor productivity grew by only 3.1 percent from this source during these 3 years. What are the reasons?

Primarily, because contracting organizations have not been paying enough attention to these most important questions. Thus, at many construction sites, organizational and technological documentation for the erection of facilities is lacking, proper engineering preparation for operations is not being performed, and outfitting of the facilities for production operations has not been organized. About 40 percent of facilities, as the data of selective inspections have indicated, are being erected without work plans. Work-plan groups and design and budget-estimating offices of construction trusts are manned by 85,000 persons, the PPR [work plan] sections of Orgtekhstroy trusts by more than 8,000. However, a large portion of these workers is not engaged in making up work plans, having been diverted to other jobs.

Production-operations outfitting of facilities has been organized in only 1 percent of construction and installing trusts. Many production-operations outfitting administrations have not been provided with a production base for the procurement of constructional parts, for making up sets of construction materials and for containerizing and packaging them.

Because of the insufficiency and low level of use of production capacity of the industries that make metal structure, reinforcing cage for



reinforced concrete, nonexpendable formwork, wooden structure, and parts, 26 percent of the rolled ferrous metals, 32 percent of the commercial timber and 55 percent of the lumber are reprocessed at the construction sites. About 200,000 workers who are engaged in construction and installing work are employed in this type of work, which, it goes without saying, affects negatively the fulfillment of tasks on raising labor productivity.

The existing system for supplying construction projects with supplies and equipment requires improvement. This is one of the most difficult problems of construction operations. This must be solved by improving management at the highest engineering level.

Because of the unresponsive work of the services that supply materials and equipment (from the ministry apparatus to the primary construction and installing organization) a so-called false shortage of various types of material resources is often formed, above-norm reserves of materials being piled up in some organizations while there is a severe shortage of them in other organizations.

Ministry, main administration and trust organs that supply materials and equipment should radically improve the planning and distribution of inventories of materials, manipulate resources responsively, provide for the shipping of complete sets of materials and structure, and use completely the capacity of the in-house production base and of subsidiary construction-organization enterprises.

Despite the high and obvious effectiveness of improving the organization of production, labor and management and the important role of these factors in raising labor productivity, not enough attention is being paid to them by the construction ministries. Questions of introducing scientific work often are resolved formalistically. Not everywhere is such a progressive form of work organization as the brigade contract being used in optimum fashion. As has been repeatedly confirmed by practice, it will help in the improvement of construction operations, the cautious consumption of materials, parts and structure, and the rational use of machinery and mechanisms. Large-scale use of the new form of economic accountability will raise the requirements for engineering preparation for construction and for the planning and supplying of materials and equipment for construction, and it will stimulate improvement in work organization and a rise in operating sophistication, reduce construction periods and improve work quality.

In 1978 about 70,000 brigades in the construction field worked under the brigade contract. They did 28.7 percent of all construction and installing work. The goal for labor productivity growth was overfulfilled by 6.3 percent, the cost of operations was lowered by 3.3 percent more than planned, and construction time was shortened by an average of 5 percent.

Despite the undoubted effectiveness of the brigade contract, its dissemination within the sector is not proceeding actively enough. Serious deficiencies are being permitted in organizing the work of brigades. Thus in

1978 the number of brigades working under contract increased by only 15 percent instead of the 22 percent planned. Brigades that had undertaken contract work worked under contract only 58 percent of the worktime because of the unsatisfactory organization of construction operations and of the supplying of materials and equipment. For the same reasons 33 percent of the contract agreements were disrupted. As a result, use of the new and progressive form of economic accountability has not exerted its due influence on the overall results of the work of construction ministries and agencies.

The managers of construction ministries and agencies, trusts, construction and installing organizations and the economic services at all levels of management should bear full responsibility for fulfilling five-year plan goals for introducing the brigade contract and for providing for normal and effective operation of the brigades.

Scientific-research organizations of construction ministries and agencies that are occupied with questions of organizing production, work and management should generalize and disseminate the experience of such collectives that lead in introducing the brigade contract as Vinnitspromstroy [Vinnitskaya Oblast Industrial Construction Combine] the Tallin Housing Construction Combine and Bridge Building Detachment No 19 and seek ways to further improve the progressive form of organizing work.

A realistic turn toward effectiveness is begun with planning, it was remarked at the November 1978 CPSU Central Committee Plenum.

The improvement of planning, radical improvement in formulation of the operations program, and providing for balance in all chapters of the plan constitute the most important area for the rational use of resources and for raising labor productivity in construction. The importance of this task is especially obvious if it is considered that at present the annual volume of construction and installing work during the construction of many facilities for production purposes averages no more than 100,000-110,000 rubles' worth. At the average value of output per facility that has been attained, 10-11 workers are employed for each facility over the year, including 7-9 workers at the construction site. Given such a "concentration" of labor resources, it is difficult to organize optimum use thereof, a factor that inevitably affects the effectiveness indicators of construction operations, mainly labor productivity.

Construction organizations, ministries and agencies should actively exert influence on the formulation of the operating program, take measures to reduce the number of facilities being erected simultaneously and, together with clients, establish an optimum sequence for the construction and introduction into operation of facilities, taking into account their production, economic and social significance, and they should conduct construction with integrated long-term flow-line groups. Scientific-research and design organizations and institutes, Orgtekhstroy trusts, and computer centers should be widely involved in solving this important problem.

The November 1978 CPSU Central Committee Plenum required USSR Gosplan, USSR Gosstroy, USSR Stroybank, ministries and agencies, and party and soviet organs to take decisive steps to improve matters in capital construction and to insure timely introduction into operation and assimilation of new production capacity. Systematic and purposeful work in this area by all contracting organizations, based upon active and complete use of reserves for labor productivity growth in construction, should become a guarantee of successful solution of the tasks set by the party.

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## METALLURGY

### FERROUS METALLURGY OFFICIAL DECRIES LOSSES

Moscow PRAVDA in Russian 9 Jun 79 p 2

[Article by A. Voronov, Deputy Minister of USSR Ferrous Metallurgy: "In the Second Circle: Efficient Management Needed"]

[Text] As is known, the melting of steel requires such raw materials as iron ore, fuel and refractories. But does everybody know that nearly one-half of all steel produced is now being smelted from metal scrap? Moreover, the smelting of steel from scrap is more expedient than from pig iron. After all, the production of pig iron requires the mining of ore and fuel as well as tremendous capital investments in the construction of mines, quarries, concentrating and sintering plants and blast furnaces. By contrast, scrap proceeds directly to open-hearth furnaces and oxygen converters. Moreover, atmospheric pollution is sharply reduced, the consumption of water is nearly halved, and production wastes are reduced.

What does amortized metal scrap mean? Broken-down industrial and agricultural equipment, transportation facilities, metal framework of buildings and structures, and household appliances--that is what it means, i.e., wastes. But their usefulness for the national economy is colossal! Calculations show that every ton of metal scrap used to produce steel replaces a ton of pig iron and this in its turn saves 28 man hours of labor. All in all, the use of metal scrap and nonferrous metal wastes by metal plants is tantamount to saving 670,000 man hours of labor in the national economy.

In this country the procurements, processing and deliveries of marketable scrap are handled by the specialized association Soyuzvtorchmet [All-Union Association for Secondary Metallurgical Products] of the USSR Ministry of Ferrous Metallurgy. It includes tens of production associations and enterprises. Household scrap in cities is collected by the organizations of the Soyuzvtorsyr'ya [All-Union Association for Secondary Raw Materials], and in the countryside, by the organizations of the Tsentrosoyuz [Central Union of Consumer Societies]. In a word, the resources focused on this task are substantial. In 1979 the procurements of metal scrap will reach nearly 50 million tons. But there is still a shortage of scrap and the plans for collecting and processing this highly valuable raw material are

implemented with great difficulty and are sometimes underfulfilled. Hundreds of thousands of tons of metal scrap are not returned to the "second circle" and instead of entering the remelting furnaces they are irreversibly lost. Why does this happen?

Statistics show that the losses of metal scrap are particularly high in the economic sectors with a low concentration of working capital dispersed over large areas--in agriculture, construction, geologic prospecting and motor transport. In particular, in agriculture about a million tons of this valuable metallurgical raw material is left to gather dust. Often scattered under the open sky, the metal rusts and becomes completely unsuitable. The reason is because the network of shops and sectors of the Vtorchermet is poorly developed in a number of krais and oblasts. For example, it is completely nonexistent in Kalmytskaya ASSR. Look at the map of that autonomous republic: its area is vast, but scrap metal from there must be transported to... Rostovskaya Oblast and Stavropol'skiy Kray. And in the Kazakh SSR, Altayskiy and Krasnoyarskiy krais, Arkhangel'skaya and Tyumenskaya oblasts and a number of other places that network is quite sparse.

Considerable difficulties are due to shortcomings in the planning of procurements of metal scrap. In this country there exist more than 400,000 scrap suppliers. But only a small proportion of these are included in the statistical reports. Moreover, the existing statistics inadequately reflect the reserves of amortized metal scrap. What does this lead to? Planning has to be based only on the actually achieved growth rate of procurements, and the concrete growth of these procurements in the future has not been taken into account. This prompts certain plant managers to acquire and keep the available metal scrap "for a rainy day," in the event that the targets for its delivery are increased. The metal is retained in the depots and undergoes corrosion.

Yet the law provides for the delivery of all metal scrap accumulating at various enterprises to the Soyuzvtorchermet in accordance with its accumulation. Moreover, if the deliveries of scrap exceed the monthly or quarterly pledges, they are credited to the fulfillment of the annual plan. However, supervision of these deliveries is weak, and administrative measures do not work. To rectify the situation, coordinated action by the USSR and union republic gosplans as well as by the ministries and departments is needed. It is high time to estimate more rigorously the inventory of scrap metal so as to prevent enterprises from concealing surpluses and keeping them "in reserve."

So far the problem of delivering scrap to metallurgical plants has not been solved. Each year a huge sum--more than R 100 million--is spent for this purpose. In other words, the transport cost is even higher than the cost of preparing the scrap for smelting. Certain departments--the ministries of construction, road, and municipal machine building, of power machine building, the machine tool and tool building and industries and others year after year plan duplicating cross-hauls of metal scrap.



This is very clearly demonstrated by the example of the Ministry of Tractor and Agricultural Machine Building. Under the plan the Khar'kov Tractor Plant is supposed to deliver 96,200 tons of carbon-steel scrap, yet at the same time it receives from the Soyuzvtorchmet system 96,100 tons of scrap. Under the plan the Lipetsk Tractor Plant is supposed to collect 19,100 tons of metal scrap and to acquire from the outside nearly the same amount of scrap. Absurd!

Trains loaded with metal scrap race from one end of the country to another. Like a blanket of falling snow, the number of railroad ton-kilometers handled increases. In reality, however, this is like treading a squirrel cage. There is a shortage of rolling stock--and how else can it be when the hauls are inefficiently planned?! At times millions of tons of scrap ready for dispatching pile up at enterprises of the Vtorchermet, solely because the railroads do not provide rolling stock.

Ferrous metal wastes vary in dimensions, size, chemical composition, etc. Now, metallurgical facilities use, as is known, raw materials with definite properties and qualities. The complete and rational utilization of metal scrap in furnaces requires its special processing. In what does that processing consist? Lightweight and undersized scrap must be compacted and separated from nonmetallic materials and nonferrous metals. It cannot be said that nothing is being done about this. Technical progress has provided interesting solutions. For example, passenger-car bodies can be processed in special crushers in which they are transformed into lumps measuring less than a square decimeter in area. By means of cold treatment it is readily possible to separate nonferrous from ferrous metals.

In practice, these innovations sometimes are not introduced. Most machine building and metalworking plants deliver completely unprocessed scrap often representing a mixture of ferrous and nonferrous metals, owing to lack of the needed equipment. And where such equipment is available, it often remains unused. Thus, three chip crushers have been installed at the Uzlovskiy Machine Building Plant imeni Fedunets, Ministry of Heavy and Transport Machine Building. But for some reasons they are not being used. As before, the plant delivers metal scrap in "natural" form. Several years ago the Kiselev Machine Building Plant of the USSR Ministry of the Coal Industry received a special baling press. But to this day that press still has not been assembled and the plant annually dispatches to each user 12,000 tons of unprocessed metal scrap. A tremendous amount of metal wastes forms at the Kama Automotive Plant. But the construction of the scrap processing shop there has not even begun yet.

The national economy needs increasing amounts of metal of high quality, alloy steel and special alloys. These cannot be produced without special additives such as vanadium, tungsten, molybdenum, nickel. But just visit the machine building enterprises and you will see there that large quantities of scarce alloy metal wastes are piled up in a mixture with regular grades of steel and even with iron.



To what does such mismanagement lead? Since metal plants receive "impure" scrap, the metal leaving the furnaces is not of the specified chemical composition and quality. Melts are not being made to order. In a word, the produced castings are defective. Particularly great infractions of the collection and storage of expensive alloy-metal wastes are observed at plants of the ministries of aviation and electronics industries. This situation is intolerable.

Considerable assistance in the more complete utilization of all scrap metal resources is being provided by the Konsomol. But as the saying goes, one does not travel far on enthusiasm alone. It is necessary to sharply tighten the personal responsibility of administrators for the plan of delivery and processing of scrap and to introduce reliable economic incentives and organizational measures so as to interest enterprises in adopting a truly businesslike approach to the collection, storage, and delivery of metal wastes.

It should not be forgotten that in the future it is precisely scrap metal that will become the principal source of raw materials for steel production. After all, the earth's iron ore reserves, while rich, are hardly limitless.

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## METALLURGY

### METALLURGISTS CALL FOR MORE EVEN SUPPLY OF RAW MATERIALS

Moscow PRAVDA in Russian 2 Apr 79 p 1

[Article: "More Raw Materials for Metallurgy"]

[Text] During the fourth year of the Five-Year Plan more than 114 million tons of iron, 156 million tons of steel, and about 109 million tons of finished rolled stock must be produced in this country. For the successful accomplishment of this task it is important, on the one hand, to efficiently organize the work of metallurgists and, on the other, to assure a smooth supply of enterprises with raw materials such as iron ore, coke, metal scrap, fluxes, and alloying materials.

The workers of the ore-mining industry are ever more actively developing their socialist labor competition under the slogan "More Raw Materials for the Metallurgists!" Since the beginning of this year the collectives of the Yuzhniy, Novokrivorozhskiy, Sokolovsko-Sarbay and other mining and concentrating combines have processed and dispatched to users hundreds of thousands of tons of raw materials in excess of the plan.

Our iron ore extraction amounts to 480 million tons annually. The output of marketable ore and of the most "high-calory feed" for blast furnaces--ore pellets--has markedly increased. Nevertheless, the demand for metallurgical raw materials is still not being completely satisfied. As a result, the production of iron, steel, and rolled stock is sometimes impeded. Yet, as observed at the November (1978) Plenum of the CPSU Central Committee by Comrade L. I. Brezhnev, [the shortage of] metal continues to hobble the development of other branches of the national economy.

Ore-mining enterprises have the potential for markedly increasing their output still further. So far the plan targets are being underfulfilled by the Dnepr, Kachkanar, Lebedinskiy, and certain other mining and concentrating combines. Their managers usually attribute this to various objective causes. However, analysis shows that the resources of the combines are being underutilized as well. At the Lebedinskiy Combine, for example, the concentrating factory which opened as far back as 1976 has still not reached its designed capacity: in the last 3 years the enterprise's debt to the state has grown to more than 3 million tons of concentrate. The heads of the Dnepr Combine do not display

due concern for preparing ore reserves. At the Mikhaylovskiy Combine in Kurskaya Oblast a lag in stripping operations has been permitted and the losses of work time are substantial--the stoppages of dump trucks and excavators in the quarry reach 25-30 percent. A low level of the mechanization of auxiliary operations during the open-strip mining of ore is characteristic of many enterprises of the branch, at which currently more than one-half of the personnel are engaged in these operations. The elimination of these shortcomings would result in a substantial rise in labor productivity.

Another important potential for expanding output is the acceleration of the construction and modernization of enterprises. The principal start-up projects include high-capacity facilities for the extraction and processing of ore at the Olenegorsk and Kovdor combines, and the nodulizing factory at the Northern Combine in Krivoy Rog. However, operations are being performed inefficiently in certain cases and the deadlines for activating various types of production are not being followed. Progress is impeded by the poor supply of construction sites with materials and equipment, particularly large-load dump trucks. There are instances of delays in the provision of design blueprints as well as of multiple revisions of original designs. The USSR Ministry of Ferrous Metallurgy, the heads of construction organizations and the local party committees are called upon to strengthen supervision over activities on the construction sites.

The past winter revealed major oversights in organizing the supply of metallurgical enterprises with coking coals. The principal suppliers--the mines of the Kuzbass, the Donbass and Vorkuta--have failed to deliver on schedule, and the coal received by the plants was often of low quality. The Vorkuta Division of the Northern Railroad does not always satisfy the demand of miners for empty rolling stock, and sometimes it delays already formed freight trains. The coke-chemical workers are also in debt to the metallurgical workers. For example, the Gubakha Coke-Chemical Plant in Permskaya Oblast underdelivered tens of thousands of tons of coke during two winter months. Altogether, during January and February the coke-chemical workers of the nation ran up a debt of nearly 700,000 tons of this valuable raw material. It should be a point of honor to the suppliers to eliminate this lag more quickly.

In this country a substantial part of steel is smelted from metallurgical scrap, each ton of which essentially replaces a ton of expensive pig iron. This year the procurements of marketable scrap should reach a volume of 50 million tons. In the last two months, however, the plants received 1.5 million tons less scrap than planned. The heads of certain enterprises prefer to hold back metal wastes "in reserve," so that valuable raw material rusts under the open sky. About one million tons of metal scrap is being irreversibly lost each year, particularly in rural areas, in which the network of procurement stations is underdeveloped. The ministries and departments as well as the local soviets and party organizations should more resolutely put a stop to this practice and bring to account those who tolerate the waste of metal scrap. At the same time, it is important to develop more actively the processing shops and sectors of the Vtorchermet [Secondary Metallurgy].

The smoothness of operations of ferrous metallurgy and the strengthening of its raw material resources largely depend on machine builders. Currently priority attention should be given to accelerating the output of reliable and highly productive mine-transport equipment, primarily of excavators with buckets of 12-20 cu m capacity, large-load quarry trucks with carrying capacities of 110-130 tons, heavy conveyer lines, and self-propelled carts for underground mining operations. The heads of and experts at the machine-building ministries should take special care to complement more rapidly the arsenal of equipment of our metallurgy, to assure its steady attainment of the goals outlined by the 25th CPSU Congress.

Now that the first quarter of the year is over, the party committees at the ore-mining combines as well as at the metal scrap processing plants should thoroughly analyze the course of plan fulfillment and rigorously call to account the culprits responsible for disruptions in the smoothness of the supply of raw materials to metallurgical enterprises. At the same time, the experience of the pace-setting labor collectives should be utilized more broadly.

Metal is the foundation of the nation's economic and defense might; it is the basis for the development of the national economy. The Homeland expects from the workers of the branch supplying metallurgy with raw materials further achievements in labor competition and the fulfillment of state plans and socialist pledges.

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## METALLURGY

### FIRST PHASE OF NADEZHDA METALLURGICAL PLANT NOW IN OPERATION

Moscow IZVESTIYA in Russian No 171 25 Jul 79 p 1

[Article by A. L'vov: "'Nadezhda' Metal"]

[Text] The State Commission has accepted for startup operation the first unit of the Nadezhdinskiy Metallurgical Plant near Noril'sk.

One can scarcely exaggerate the importance of this event for Soviet industry. Up to the present time copper-nickel ore with a high iron and sulfur content has not been utilized: the traditional process lacked the capability of efficiently extracting nonferrous metals from these ores. But now it has become possible. Millions of tons of ore from temporary storage sites will be processed -- their time has finally come. In addition, as long as Noril'sk has been in existence, it has roasted sulfur out of the ore in the process of obtaining metals -- sulfur reduces the purity of nickel, copper, and cobalt. The sulfur "went up the chimney." Commercial sulfur has now been added to the products of the Noril'sk Combine.

NMZ -- Nadezhdinskiy Metallurgical Plant -- has been born. Here it is referred to with a single word: "Nadezhda" [Hope]. Gazing at the huge shops, one ponders over what man is capable of accomplishing. This was once permafrost-hard ground. The ground was blasted, laying bare the bedrock. A foundation was erected from a depth of 9 meters, and on that foundation was erected Nadezhda's first process shop; alongside the first shop a second and third were built....

Autoclave shop. When they read this designation on the drawings and on the construction road signs, the name seemed alien to Noril'sk, which was accustomed to electrolysis and smelting. But now autoclaves, reactors, pumps and tanks stood on the foundation, and they became just as familiar to the town as its old factory shops, streets and squares.

Accompanied by process engineer N. Mal'tsev, we strode up ramps toward the central control console. The instruments mounted on the console record a couple of dozen readings on what is taking place in the autoclaves. We saw black pulp (a suspension of particles in water) prior to entering the autoclaves, and red pulp -- after leaching. And somewhere far below we could hear the noise produced by the "mixers," which look like screw

propellers, in the armor-plated autoclaves. A mysterious chemical process -- bringing ore closer to metal -- takes place under high pressure.

The new process was developed by scientists from Noril'sk, Moscow, and Leningrad. It is very important to note that the process sequence, from beginning to end, employs operations taking place in aqueous solutions, in tightly-sealed equipment. Therefore there is no harmful gas pollution ejected into the atmosphere, and practically the entire sulfur contained in the raw ore comes out as finished product.

The smoking chimney, as the old symbol of metallurgical production, is slowly receding into the past in many of our cities. Here, beyond the Arctic Circle, a major step has been taken toward smokeless metallurgy. The new process has proven its viability: for several years now a small copy of the first Nadezhda unit has been operating in a continuously operating enterprise mode. The autoclave process laboratory has also produced cadres for Nadezhda -- the backbone of the plant's work force. The managerial personnel are young: 35... 30... 27. Plant party committee secretary Vladimir Plyukhin is 31 years old.

"Yesterday's college graduates," he relates, "have taken our foremen's jobs. One hundred of our workers are from the local trade school, which has competitive entrance examinations, just like college. We have brought in only 50 persons from the outside, including several engineers who are sulfur production specialists."

Yes, the level of specialist training is one of Noril'sk's impressive achievements. Incidentally, Al'bert Voronov, director of the Nadezhdinskiy Plant, is rated as the best among autoclave technology inventors. The chief chemist and the chief of the technical inspection division possess academic degrees....

The shifts and services under Igor' Gankin, Nikolay Men'shikov, Nikolay Chirkov, and Oleg Timofeyev were winners in the competition for the honor of turning out the first tons of product. Noril'sk has "become accustomed" to these names. The entire industrial region is familiar with the Nadezhda construction workers -- such as Petr Churkin, Nikolay Dotsenko, Yuriy Kondratov, and Mikhail Vashkevich. The immediate goal of the metallurgical workers is to reach designed output as quickly as possible. The target of the 17,000 man construction worker force is to speed up completion of the plant's second unit.

Nadezhda is targeted to increase Noril'sk metals production by 50%.



## METALLURGY

### ACHIEVEMENTS OF TULACHERMET SCIENTIFIC-PRODUCTION GROUP REVIEWED

Moscow IZVESTIYA in Russian No 135, 13 Jun 79 p 2

[Article by A. Manokhin, Corresponding Member, USSR Academy of Sciences, General Director, Tulachermet Scientific-Production Association, recipient of Lenin and State Prizes: "Strong Alloy"]

[Text] The new and higher levels of achievement reached by our nation's economy demand further acceleration of scientific and technological progress and, consequently, further strengthening of the bond between science and production.

"The success of the scientific and technological revolution and its beneficent influence on the economy, on all aspects of societal affairs cannot be secured by the efforts of scientific personnel alone," emphasized CPSU Central Committee General Secretary Comrade L. I. Brezhnev, Chairman of the Presidium of the USSR Supreme Soviet, in his address at the 25th CPSU Congress. "An increasingly important role is being played by drawing into this process of historic significance all participants in societal production, all elements of the economic mechanism."

Five years ago the Ministry of Ferrous Metallurgy established in Tula the Tulachermet Scientific-Production Association, into which were incorporated the already-existing Novotul'skiy Metallurgical Plant, an affiliate of the Central Scientific Research Institute of Ferrous Metallurgy, which was subsequently made into an industrial design institute, and the Revyakino Rolling Plant. The association was assigned important economic tasks -- to develop new industrial processes, to increase the efficiency of scientific research activities, to provide prompt experimental verification of research results and rapid adoption into production of scientific and technological achievements, thus promoting technical advances throughout the branch.

Why was this association established in Tula? Tula is the birthplace of our country's metallurgical industry: Russia's first blast furnace was started up here, on the Tulitsa River, in the 17th century. During the years of the first five-year plans new industrial processes in ferrous metallurgy and experimental-industrial installations were developed at the Novotul'skiy

Metallurgical Plant under the supervision of Academician I. P. Bardin. This plant, serving as an experimental base for the Branch, is located on a common site with a scientific research institute, a fact of great importance.

The association's scientists and production workers were to establish a new organizational structure, to become a unified work force. But no practices or traditions had been established. Our people studied the experience of many associations throughout the country, relying particularly on the practical experience of the work forces of the Electric Welding Institute imeni Paton of the Ukrainian SSR Academy of Science, the Noril'sk Mining and Metallurgical Combine imeni Zavenyagin, and the Novolipetskiy Metallurgical Plant.

Tulachermet's five years of operations provide a firm basis for reaching a conclusion: the scientific-production association is a progressive and viable form of linking science with production. The target for the first three years of the five-year plan for product sales was surpassed by the association by 5.5 million rubles. A total of 25 experimental-industrial installations and sections were built; 147 scientific research projects of great significance to the nation's economy were carried out, 78 of which were incorporated into industrial production. Savings to the economy totaled 17.8 million rubles, including 14.3 million rubles from the incorporation of scientific research project results. The return per ruble spent on science increased more than sixfold.

The association work force, jointly with the personnel of a number of other institutes and design organizations, developed a new manufacturing process, developed and installed the world's largest installation for the production of ferrovanadium, which provides the capability to obtain top-grade metal, to expand the product mix, and to maintain a clean environment. This project was awarded the Lenin Prize.

The Principal Directions of Development of the USSR National Economy in 1976-1980 specified a substantial increase in the manufacture of continuous steel casting installations. The people at the association and the staff of the Ukrainian Scientific Research Institute of Ferrous Metallurgy have developed a horizontal machine for continuous steel casting. The equipment weighs from 38 to 45% less than other installations. It can be installed in presently-operating shops without high ceilings or deep pits. Simplicity of design and the horizontal positioning of the equipment facilitate operation and maintenance. Overall savings total almost 2 million rubles per year per installation.

A process was developed jointly with the people at the Central Scientific Research Institute of Ferrous Metallurgy for producing large-diameter continuous castings -- up to 550 millimeters -- for the manufacture of one-piece-rolled wheels for railroad cars, solid and semicircular blanks for seamless pipe. Adoption of the new process at the Dnepropetrovsk Metallurgical Plant will result in savings of up to 90,000 tons of metal per year.

A continuous casting machine has been put into experimental operation, producing two and three-layer bimetallic castings of various shapes and combinations for plow moldboards and chemical equipment. Metallographic and mechanical examinations of bi-metal in the cast and forged state demonstrated its high strength.

As we know, converters compare favorably with open-hearth furnaces: they boost labor productivity by 50-100%, reduce consumption in converting pig iron to steel, reduce production cost, improve working conditions, and eliminate air pollution. The people at the association have developed a converter process with bottom oxygen blowing, which possesses a number of advantages over converters with top blowing.

Powder metallurgy provides the opportunity to develop new materials, to reduce production labor requirements, and substantially to reduce metal waste and losses. The association has developed a unique installation, has developed and begun producing 135 new materials, which are presently being utilized by 500 Soviet enterprises. Utilization of powder materials for surfacing parts, components and assemblies extends their life. It has been noted in the press, including on the pages of IZVESTIYA, that the existing procedure of development of a new project from idea to commercial product fails to meet today's requirements of scientific and technological progress. Too much time is spent on various coordinating actions with a great many organizations. As is indicated by practical experience, with observance of all present procedures, the road from idea to industrial testing, even with the most favorable confluence of circumstances, takes more than 10 years. This slows down technical retooling of the nation's economy.

In many instances our association has succeeded in avoiding lost time. It took less than 4 years to set up the world's largest ferrovanadium production operation, from semiindustrial tests to full designed output. It took two years to produce the horizontal steel casting machine, with intermediate construction of an experimental-industrial installation. A unit for spraying molten metal was designed, built and put into operation within 8 months. This is perhaps the shortest time for embodiment of an idea into a full-scale installation in our country's history.

What helps us accomplish complex projects in such a short time? First of all the fact that a unified scientific-production complex includes a research center, a production base and support subdivisions. Secondly, our scientific research projects are strictly aimed at accomplishing concrete economic tasks, most frequently for a specific client, who takes active part both in development and incorporation into production, and provides needed material-technical assistance. And finally, an important role is played by the establishment of in-plant, interplant and interbranch development teams, as well as extensive involvement of scientific and production work forces throughout the country in scientific research projects.

In developing ferrovanadium production, for example, a development team was set up, which contained leading designers from the Giprostal' Institute and process engineers from the Central Scientific Research Institute of Ferrous Metallurgy and the Chelyabinsk Scientific Research Institute of Metallurgy. All construction and installation subdivisions were subordinate to this group.

An example of the fruitfulness of direct ties is cooperation with the Electric Welding Institute imeni Ye. Paton of the Ukrainian Academy of Sciences and the Aktyubinsk Ferroalloys Plant, which made it possible to develop within a period of 18 months industrial production of high-quality chromium carbide and to reduce production cost sixfold.

A socialist cooperation agreement with the ZIL Association made it possible to develop and perfect a process for producing synthetic alloy cast iron within 1 year.

All this does not signify that everything is going smoothly and the association is experiencing no difficulties. But the work force is working persistently to overcome them. At this point we should like to discuss problems the solution of which will make it possible to increase the efficiency of the scientific research activities of scientific-production associations and speed up completion of development projects to the production stage.

The existing procedure of ordering equipment inevitably leads to considerable time losses. In our opinion orders for new equipment must be given priority. The Ministry of Ferrous Metallurgy as well as other ministries should maintain special funds, materials and equipment for these purposes.

It is easier for construction organizations to work on vacant sites. But scientific-production associations possess specific features. After completing the development of one process, they must reorganize the area for work on another development project. In order for facilities incorporating new technology to be erected faster, we should revise the wages of construction workers employed on such projects and boost their work incentive on a job complicated by the conditions of existing production.

In our opinion it is advisable to improve targeted labor productivity indices for workers engaged in experimental production. And of course the scientific-production association should be exempted from annually-targeted work force cutbacks. It is high time to revise the criteria for evaluating the performance of scientific-production associations. Accomplishment of the scientific research project plan target and adoption into production of new processes, technologies and machinery should become the principal indicator for them.

The people of our association are working on new and important scientific and economic tasks. Utilizing the vast capabilities opening up due to the strong alloying of science with production, we shall endeavor to find optimal solutions, to turn them over to industrial enterprises as quickly as possible, and to make our contribution toward implementing the resolutions of the 25th CPSU Congress.

## CARBIDE-NITRIDE STRENGTHENING OF STEEL

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian No 174, 31 Jul 79 p 3

[Article by A. Manokhin, General Director, Tulachermet Scientific-Production Association, Director of the USSR Academy of Sciences Institute of Metallurgy, Corresponding Member of the USSR Academy of Sciences: "Stronger and Cheaper"]

[Text] Stronger and more reliable alloys, providing long life to structures and buildings, are increasingly needed by the economy. The problem, however, is that in recent years, when loads and stresses on metal have sharply increased, carbon and conventional low-alloy steels have lacked precisely these qualities. Their employment in construction for the fabrication of multipurpose structures was becoming increasingly less effective. More reliable, stronger and cheaper structures were needed. Therefore specialists at a number of enterprises, metallurgical and construction institutes embarked upon a long search for new steel formulations. As a result of careful calculations, a great many experiments, semiindustrial and industrial tests, a totally new method of specifically influencing the structure and properties of metal was developed, the method of carbide-nitride hardening. This method is as follows: relatively small amounts of vanadium, aluminum, and nitrogen are added to steel. They are also called carbide and nitride forming elements. As a result of these additions, the steel takes on a particularly fine-grained structure. This increases its strength, toughness, and resistance to brittle and fatigue failure. The employment of such steels in construction makes it possible to reduce metal consumption by 20-30% and appreciably to increase the reliability of machinery operating at temperatures as low as  $-70^{\circ}$ .

A number of high-strength structural steels were developed. Many of them have now been adopted as state standards, some of which have been accepted within the CECA. They are all standardized in strength levels ensuring reliable machinery operation under various conditions, including in the Far North.

Rolled stock made of the new structural steels is being produced in large quantities on the rolling mills of the Orsk-Khalilovo and Nizhniy Tagil Metallurgical Combines, as well as a number of other plants. Neither additional capital investment nor even renovation was required to incorporate



the new process. The technology ensures a high process efficiency at all stages, does not worsen working conditions for operating personnel, and does not pollute the atmosphere. Thanks to the extensive adoption of this process, our country is the world leader in the production and utilization of carbide-nitride hardened steels.

Vanadium is the principal alloying element which produces a substantial change in the properties of steels with carbide-nitride hardening. Employment of vanadium makes it possible to save for the nation's economy 250,000 tons of rolled steel valued at approximately 30 million rubles. Steels with carbide-nitride hardening are extensively employed in erecting the welded frames of large industrial buildings, the frames of large blast furnaces, highway and railway bridges, including on the Baykal-Amur Mainline; oil storage tanks, gas storage tanks, heavy cranes, as well as the largest Olympic sports facilities.

At the present time vanadium requirements are met with the combined processing of Ural titanomagnetites from the Kachkanarskoye deposit. The advisability of constructing a second Kachkanarskoye Mining and Ore Beneficiation Combine has become evident with the increased demand for carbide-nitride hardened steels. A second combine will make it possible to increase this country's vanadium production and will broaden the iron ore base of Urals ferrous metallurgy, which will make it possible to reduce the hauling of iron ore to the Urals from the Kursk Magnetic Anomaly. Just by reducing hauling costs, the nation's economy will obtain savings of approximately 60 million rubles per year. Substantiation for construction of a large new metallurgical enterprise in the Urals can be considered the result of many years of collective labor by a team of scientists and practical experts, who elaborated an entire aggregate of problems connected with producing carbide-nitride hardened steel. Thus this new product has not only produced great savings but has also opened up additional prospects for the growth and development of Urals ferrous metallurgy.

We believe that this important project deserved its nomination for a 1979 State Prize in the area of science and technology and merits strong recognition.

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## METALWORKING EQUIPMENT

### ECONOMICS OF MACHINE BUILDING INDUSTRY ANALYZED IN NEW BOOK

Moscow MASHINOSTROITEL' in Russian No 5, 1979 p 36

[Review by Candidate of Economic Sciences V. E. Kokhman of the book "Ekonomika mashinostroitel'noy promyshlennosti SSSR" by V. S. Byalkovskaya, M. N. Demchenko, and V. B. Kosichkina, Mashinostroyeniye, Moscow, 1978, 415 pages]

[Text] Firm ties have been established between the economics and production organization section of the Moscow Scientific and Technical Propaganda House and the editorial staff of the same designation of the Mashinostroyeniye Publishing House. People from industry, scientific research institutes, ministries and agencies, as well as prominent scientists participate in regularly-held get-togethers with the editorial staff. Business-like, highly-professional group discussion of published literature guides the publishing people toward publication of the most important books and improvement in their quality. The most recent meeting, held in December 1978, also contained a lively discussion. G. I. Barykova, in charge of the editorial staff, discussed the publications schedule for 1979 and the draft schedule for 1980 and the new five-year plan.

Those present at the meeting discussed a textbook by V. S. Byalkovskaya, M. N. Demchenko, V. B. Kosichkina entitled "Ekonomika mashinostroitel'noy promyshlennosti SSSR" [Economics of the USSR Machine Building Industry] (Moscow, Mashinostroyeniye, 1978, 415 pages) and recently-published literature on product quality control. People from enterprises, scientific research institutes and higher educational institutions took part in the discussion.

It was noted in the discussion that the textbook encompasses all principal questions pertaining to the economics of machine building and is written on a high scientific and theoretical level. The authors have presented sequentially and fairly completely the multifaceted aspects of economic work in this branch and in a number of cases recommend a modern economic-mathematical edifice for forming plan indices and analysis of their execution.

Extremely extensively presented in the textbook is the advanced know-how of machine building enterprises and associations in the USSR and the CEMA nations, forecasting methods and practices; the authors discuss new problems which had not been previously discussed in textbooks on this subject, and they examine

in detail questions pertaining to economics and planning of scientific research and design activities.

On the whole the textbook is written in an easy-to-understand manner, and it does a good job of presenting illustrative material -- statistical data, and examples illustrating the most complex questions; it is distinguished by excellent quality of printing.

The speakers noted that the textbook is intended not only for college students and instructors but also for a broader audience of people in industry. In this connection one regrets the insufficiently large press run. In view of the fact that under conditions of a rapid pace of scientific and technological advances in machine building a textbook on the economics of this industry rapidly becomes obsolete, it is necessary to proceed at once with preparations for a revised edition.

Those present at the conference presented a number of specific suggestions and critical comments aimed at further improving the quality of the textbook. It was noted, for example, that the textbook's structure, which is determined by the ratified course program, is unique, and for the most part successful, although some elements are debatable. For example, it is hardly expedient to examine the essence of the subject, the tasks and methodology of the course in the second chapter, while examining the system of indices of production efficiency in the introduction, the place and role of machine building in the nation's economy in the first chapter, and the technical-economic features of machine building and its branch structure in the third chapter. A matrix of indices of production efficiency and technical-economic indices suggested by the authors brought no objections, but some of these require refinement. There is also need for some additional work on the chapter entitled "Personnel, Labor Productivity, and Wages." Not all definitions are sufficiently complete, and some calculation formulas require detailed explanation and refinement. There are no definitions for such terms as technological (piece-rate) and hourly-rate labor intensiveness [tekhnologicheskaya (sdel'naya) i povremennaya trudoyemkost']. The question of accelerating labor productivity is not presented in a sufficiently understandable fashion. The authors have introduced quite unusual dimension units (rubles/man<sup>2</sup> and piece/man<sup>2</sup>), and for this reason they should be explained in greater detail.

On the whole, as the speakers noted, the book is unquestionably a substantial contribution to textbook literature on the economics of machine building under the conditions of developed socialism. It fairly comprehensively reflects the fundamental instructions of the CPSU and Soviet Government on economic questions and the achievements of the science of economics at the contemporary level. Examination of problem items in this textbook enhances its practical value and focuses the reader on a productive study of economics and branch planning.

In the discussion of literature on production quality control it was noted that the Mashinostroyeniye Publishing House publishes an insufficient number of books on this subject. And yet there is great need for this literature,

especially that which has a practical emphasis and assists designers, process engineers and production specialists in improving product quality and contains information on advanced know-how of Soviet and foreign enterprises in this area. Praised in this connection was a book by G. Ya. Mazer and N. I. Tretnikov entitled "Effekt kachestva" [Effect of Quality] (Moscow, Mashinostroyeniye, 1976, 144 pages), in which the authors, on the basis of analysis of considerable factual material, present concrete practical recommendations on ensuring quality of machinery in the process of design, manufacture and operation. Also highly praised was the collective-authorship monograph (edited by doctors of economic sciences A. V. Glichev and L. Ya. Shukhgal'ter) entitled "Kachestvo produktsii i effektivnost' proizvodstva" [Product Quality and Production Efficiency] (Moscow, Mashinostroyeniye, 1977, 247 pages).

The participants in the meeting suggested adding to the publishing schedule for the new five-year plan volumes on the economics and organization of auxiliary production, on the economics of utilization of fixed assets, a guide for design of machine building enterprises, as well as systematized publication of "The Machine Building Enterprise Foreman's Library" pamphlets, etc.

Such extensive discussions of published literature, when the highly-professional collective opinion of the engineer and technician community is expressed, should also become the standard practice for other editorial staffs of the Mashinostroyeniye Publishing House.

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## METALWORKING EQUIPMENT

### BRIEFS

**AUTOMATED ROLLER MACHINING LINE**--An automatic line for machining the spindles of belt conveyer rollers has been developed at the All-Union Planning and Technological Institute of Heavy Machinery Manufacture. The line can machine the axles or spindles of six type sizes, ranging in length from 332 to 485 mm. The line consists of six metal-cutting machine tools: two semiautomatic lathes, two gang tools and two grinding machines. A feature of the line is the fact that it is equipped with a system of conveyer-storage units and robot operators, providing total automation of the processes of machining and packing finished product into standard packing containers. Annual savings from incorporation of this line will total approximately 65,000 rubles. The line doubles labor productivity and eliminates nine jobs (VDNKh SSSR). [Text] [Moscow MASHINOSTROITEL' in Russian No 5 1979 p 38]

**PRESS-FITTING DEVICE**--A device has been developed, designated 7801-5013, for press-fitting inset rings onto hydraulic lines 12, 16, 20, 24, and 32 mm in diameter. It consists of a case, containing a hydraulic cylinder, a set of interchangeable sleeves, supports and a small 7027-5001 hydraulic unit. Employment of this device will improve labor productivity, sophistication of production and work quality (VDNKh SSSR). [Text] [Moscow MASHINOSTROITEL' in Russian No 5 1979 p 38]

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